MOTOROLA
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CP150™ /CP200™

Commercial Series

Two-Way Radio Detailed Service Manual

Radius®

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Related Publications

CP150/CP200 Basic Service Manual 6880309N61
CP150/CP200 User Guide 6880309N60

Chapter 1 Test Equipment, Service Aids, and Service Tools

1.1 Test Equipment

Table 1-1 lists test equipment required to service the CP150/CP200 Radios.

Table 1-1. Recommended Test Equipment

Motorola Part No.	Description	Characteristics	Application
R2600 series	System analyzer	This item will substitute for items with an asterisk (*)	Frequency/deviation meter and signal generator for wide-range troubleshooting and alignment
*R1074A	Fluke 87 digital multi-meter	True RMS metering, 200 kHz frequency counter, 32-segment bar graph with backlit display	Digital voltmeter is recommended for AC/DC voltage and current measurements
	Fluke 85 RF probe	500 MHz, 30 VAC max	Use with Fluke 87 digital multi-meter for RF voltage measurements.
*R1377A	AC voltmeter	1 mV to 300 mV, 10 mega-ohm input impedance	Audio voltage measurements
R1611A	Dual channel 100 MHz oscilloscope (Agillent)	Two-channel, 100 MHz bandwidth, 200 M sample rate/sec, 2 MB memory/ channel	Waveform measurements
S1339A	RF millivolt meter	100 μV to 3V RF, 10 kHz to 1 GHz frequency range	RF level measurements
*R1013B or *R1370A	SINAD meter or SINAD meter with RMS	Without RMS audio voltmeter or With RMS audio voltmeter	Receiver sensitivity measurements

1.2 Service Aids

Table 1-2 lists service aids recommended for working on the CP150/CP200 Radios. While all of these items are available from Motorola, most are standard shop equipment items, and any equivalent item capable of the same performance may be substituted for the item listed.

Table 1-2. Service Aids

Motorola Part No.	Description	Application
RLN4460	Portable Test Set	Enables connection to the audio/accessory jack. Allows switching for radio testing.
RLN4510	Battery Interface	Regulates DC current and voltage between radio and power supply.
RVN4191	Customer Programming Software and Global Tuner Software on CD Rom	Program customer option and channel data.
AAPMKN4004	Programming Test Cable	Connects radio to RIB (PLN4008).
AAPMKN4003	Radio-to-Radio Cloning Cable	Allows a radio to be duplicated from a master radio by transferring programmed data from the master radio to the other.
RLN4008	Radio Interface Box	Enables communications between the radio and the computer's serial communications adapter.
5886564Z01	RF Adaptor	Adapts radio's antenna port to BNC cabling of test equipment.
0180305K08	Shop Battery Eliminator	Interconnects radio to power supply.
HSN9412	Wall-Mounted Power Supply	Used to supply power to the RIB (120 VAC).
3080369B71 or 3080369B72	Computer Interface Cable	Use B72 for the IBM PC AT or newer (9-pin serial port). Use B71 for older models (25-pin serial port). Connects the computer's serial communications adapter to the RIB (PLN4008).
6686533Z01	Knob Remover/Chassis Opener	Used to remove the front cover assembly.
HKN9216	IBM Computer Interface Cable	Connection from computer to RIB.
8180384N65	Housing Eliminator	Allows testing of the radio outside of the housing.

Table 1-3. Recommended Service Tools

Motorola Part No.	Description	Application
RSX4043A	TORX™ screwdriver	Tighten and remove chassis screws
6680387A70	T6 TORX bit	Removable TORX screwdriver bit
R1453A	Digital readout solder station	Digitally controlled soldering iron
RLN4062A	Hot air workstation, 120 V	Tool for hot air soldering/desoldering of surface mounted integrated circuits

Table 1-3. Recommended Service Tools (Continued)

Motorola Part No.	Description	Application
0180386A78	Illuminated magnifying glass with lens attachment	Illumination and magnification of components
0180302E51	Master lens system	
0180386A82	Anti-static grounding kit	Used during all radio assembly and disassembly procedures
6684253C72	Straight prober	
6680384A98	Brush	
1010041A86	Solder (RMA type), 63/67, 0.5mm diameter, 1 lb. spool	
0180303E45	SMD tool kit (included with R1319A)	
R1319A	ChipMaster (110 V)	Surface mount removal and assembly of surface mounted integrated circuits and/or rework station shields. Includes 5 nozzles.
R1321A	ChipMaster (220 V)	
ChipMaster Nozzles:		
6680332E83	PLCC-28* nozzle	Soldering and Un-soldering IC's
6680332E82	PLCC-44* nozzle	
6680332E94	PLCC-52 nozzle	
6680332E96	PLCC-84 nozzle	
6680334E67	QFP-160 nozzle	
6680333E46	SOL-18 nozzle	
6680332E84	SOIC-20 nozzle	
6680332E87	SOL-20J nozzle	
6680333E45	SOL-24 nozzle	
6680333E55	TSOP-64 nozzle	

* Included with ChipMaster packages

Programming/Test Cable

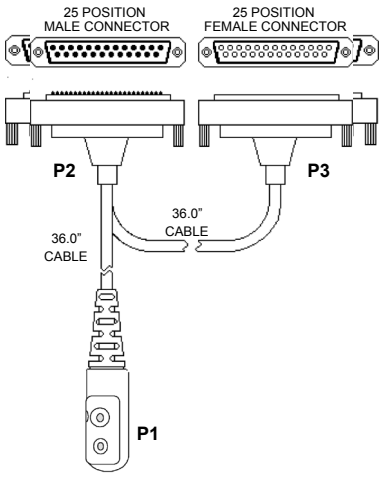


Figure 1-1. Programming/Test Cable

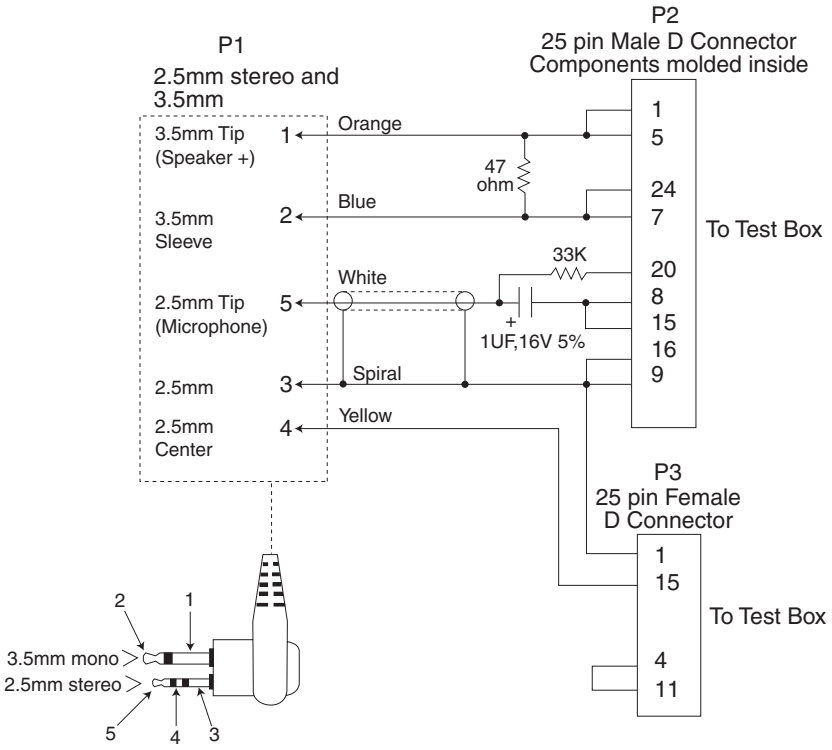


Figure 1-2. Wiring of the Connectors

Chapter 2 DC Power Distribution

2.1 DC Regulation and Distribution

A block diagram of the DC power distribution throughout the radio is shown in Figure 2-1.

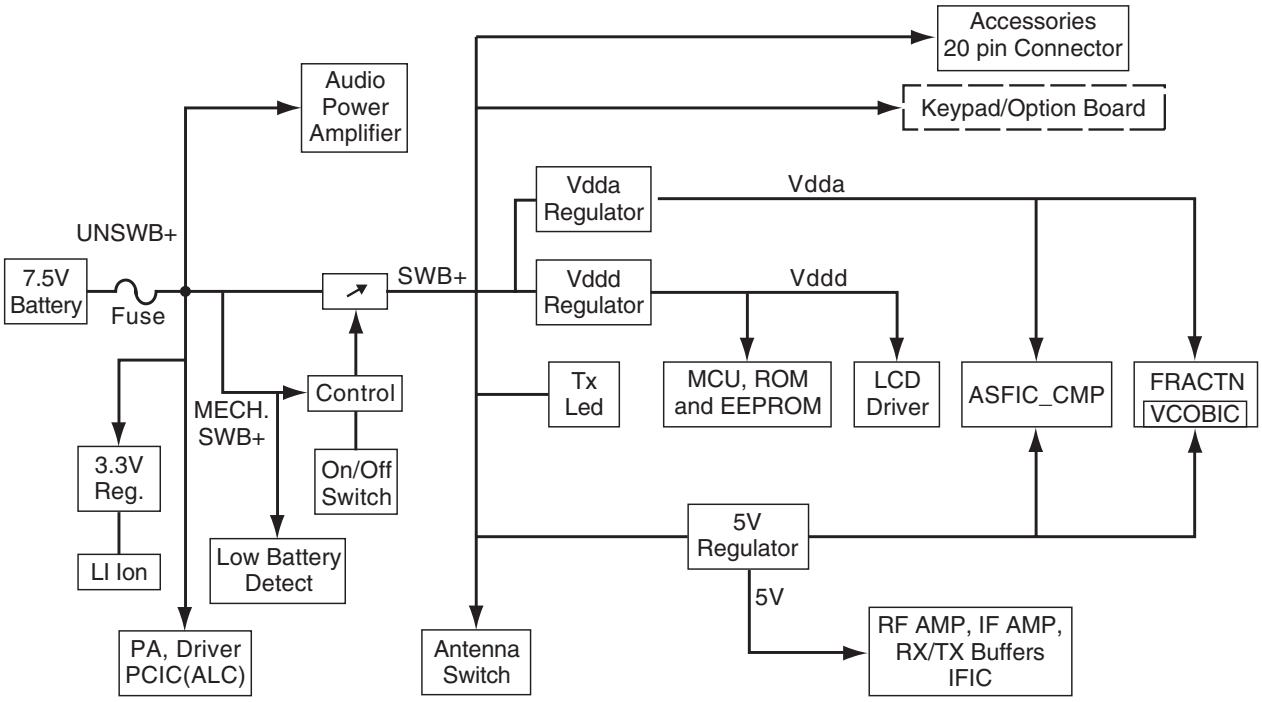


Figure 2-1. DC Power Distribution Block Diagram

Battery voltage enters at connector J301 and is routed through fuse F301 to become USWB+. VR301 protects against ESD, and D301 provides reverse polarity protection. This voltage is routed to:

- FET switch Q170 in the TX power control circuit (turned on during transmit)
- TX power amplifier module U110 (via R150)
- input pins of regulators U310, U320 and U330
- FET switch Q493 (turned on whenever the radio is on)
- on-off switch S444 (part of on-off-volume control) to become SWB+

When the radio is turned on, SWB+ is present and is applied to:

- transistor switch Q494 (pins 1 and 6) which turns on Q493
- RX audio power amplifier U490
- voltage divider R420/R421 and port PE0, a microprocessor A/D input which measures battery voltage and radio on/off status

The output of FET switch Q493 is applied to the control pins of regulators U310, U320 and U330, turning them on. The following regulators are used:

Table 2-1. Voltage Regulators

Reference No.	Description	Type
U310	5 V Regulator	TK71750S
U320	Digital 3.3 V Regulator	LP2986
U330	3 V Regulator	TK71730S

The 5 V source is applied to:

- RX back end circuitry
- synthesizer super filter input and charge pump supply
- RED/GRN LEDs
- RX audio buffer U510
- portions of ASFIC U451

The 5 V source is also applied to FET switches Q311 and Q312. Q311 is turned on by Q313 when RX_ENA (from U401 pin 49) is high, and supplies the "5R" source to the RF front end stages Q21-Q22, and the VCO RX injection buffer Q280. Q312 is turned on by Q313 when TX_ENA (from U401 pin 50) is high, and supplies the "5T" source to the first transmitter stage Q100.

The digital 3.3 V source from U320 (D_3.3 V) is applied to:

- microprocessor U401
- EEPROM U402
- flash ROM U404

The 3 V regulated source from U330 is applied to:

- synthesizer IC U201
- VCO/buffer IC U251
- portions of ASFIC U451
- microphone bias circuitry

While the radio is turned on, port PH3 (U401 pin 44) is held high. When the radio is turned off, SWB+ is removed and port PE0 (U401 pin 67) goes low, initiating a power-down routine. Port PH3 (pin 44) remains high, keeping the voltage regulators on via Q493 and Q494, until the operating state of the radio has been stored in EEPROM and other turn-off data functions have been completed. PH3 then goes low, turning off Q494 and Q493, and all regulated voltages are removed.

Chapter 3 Controller Theory of Operation

3.1 Controller

The controller provides the following functions:

- interface with controls and indicators
- serial bus control of major radio circuit blocks
- encoding and/or decoding of selective signaling formats such as PL, DPL, MDC1200 and Quik-Call II
- interface to CPS programming via the microphone connector
- storage of customer-specific information such as channel frequencies, scan lists, and signaling codes
- storage of factory tuning parameters such as transmitter power and deviation, receiver squelch sensitivity, and audio level adjustments
- power-up, power-down and reset routines

Figure 7-3 (VHF) shows the interconnection between the controller and the various other radio blocks. Figure 7-9 show the connections between the following circuit areas which comprise the controller block:

- microprocessor circuitry
- audio circuitry
- DC regulation circuitry (refer to Chapter 2, DC Regulations and Distribution.)
- rotary and pushbutton controls and switches
- option board interface

The majority of the circuitry described below is contained in the (VHF) Microprocessor Circuitry schematic diagrams (Figure 7-10). Portions are also found in the Audio and DC Regulation schematics (Figures 7-11 and 7-12).

3.1.1 Microprocessor Circuitry

The microprocessor circuitry includes microprocessor (U401) and associated EEPROM, S-RAM (not used in PR400 models), and Flash ROM memories. The following memory IC's are used:

Table 3-1. Radio Memory Requirements

Reference No.	Description	Type	Size
U402	Serial EEPROM	AT25128	16K x 8
U403	Static RAM	(not used)	
U404	Flash ROM	AT49LV001N_70 V	128K x 8

3.1.1.1 Memory Usage

Radio operation is controlled by software that is stored in external Flash ROM memory (U404). Radio parameters and customer specific information is stored in external EEPROM (U402). The operating status of the radio is maintained in RAM located within the microprocessor. When the radio is turned off, the operating status of the radio is written to EEPROM before operating voltage is removed from the microprocessor. See section "3.1.1.7 Microprocessor Power-Up, Power-Down and Reset Routine" on page 3-3 for a discussion of the power-down routine.

Parallel communication with U403 and U404 is via:

- address lines A(0)–A(16), from U401 port F ADDR0–ADDR13 and port G XA14–XA16
- data lines D(0)–D(7), from U401 port C DATA0–DATA7
- chip-select for U403, from PH6 (U401 pin 41)
- chip-enable for U404, from PH7 (U401 pin 38)
- output enable for U404, from PA7 (U401 pin 86)
- write-enable for both U403 and U404, from PG7_R/W (U401 pin 4)

Serial communication with U402 is via:

- the SPI bus (see section "3.1.1.3 Serial Bus Control of Circuit Blocks" on page 3-2)
- chip-select for U402, from PD6 (U401 pin 3)

3.1.1.2 Control and Indicator Interface

Ports PI3 and PI4 are outputs which control the top-mounted LED indicator. When PI3 is high, the indicator is red. When PI4 is high, the indicator is green. When both are high, the indicator is amber. When both are low, the indicator is off.

Pressing the side-mounted PTT button (S441) provides a low to port PJ0 (U401 pin 71), which indicates PTT is asserted. Side-mounted option buttons 1 and 2 (S442 and S443) are connected to Ports PJ6 (pin 77) and PJ7 (pin 78), respectively.

3.1.1.3 Serial Bus Control of Circuit Blocks

The microprocessor communicates with other circuit blocks via a SPI (serial peripheral interface) bus using ports PD2 (data into uP), PD3 (data out of uP) and PD4 (clock). The signal names and microprocessor ports are defined in Table 3-2.

Table 3-2. SPI Bus Signal Definitions

Signal Name	Microprocessor Port	Microprocessor Pin
SPI-DATA_IN	PD2-MISO	U401 Pin 99
SPI_DATA_OUT	PD3-MOSI	U401 pin 100
SPI_CLK	PD4-SCK	U401 pin 1

These signals are routed to:

- the audio filter IC (U451) to control internal functions such as gain change between 25 kHz and 12.5 kHz channels, transmit or receive mode, volume adjustment, etc.
- the synthesizer IC U201 to load receive and transmit channel frequencies
- option board connector J460-1 for internal option configuration and control
- serial EEPROM U402 (both SPI_DATA_IN and SPI_DATA_OUT are used).

In order for each circuit block to respond only to the data intended for it, each peripheral has its own chip select (or chip enable) line. The device will only respond to data when its enable line is pulled low by one of the microprocessor ports, as follows:

- port PD5 (U401 pin 2) for the audio filter IC
- port PH0 (U401 pin 47) for the synthesizer IC
- port PD6 (U401 pin 3) for the serial EEPROM.

3.1.1.4 Interface to RSS Programming

The radio can be programmed, or the programmed information can be read, using a computer with CPS (Customer Programming Software) connected to the radio via a RIB (radio interface box) or with the RIB-less cable. Connection to the radio is made via the microphone connector (part of accessory connector J471). The SCI line connects the programming contact (J471 pin 6) to ports PD0_RXD (data into uP, pin 97) and PD1_TXD (data out of uP, pin 98). Transistor Q410 isolates the input and output functions by allowing PD1 to pull the line low, but does not affect incoming data from being read by port PD0. This isolation allows high-speed 2-wire programming via TP401 and TP402 for factory programming and tuning.

3.1.1.5 Storage of Customer-Specific Information

Information that has been programmed using CPS, such as channel frequencies or selective signaling codes, are stored in the external EEPROM, where it is retained permanently (unless reprogrammed) without needing DC power applied to the microprocessor.

3.1.1.6 Sensing of Externally-Connected Accessories

Port PJ1 is used to detect the presence of externally connected accessories. Port PJ1 (U401 pin 72) is normally low, unless accessories (lapel speaker microphone, lightweight headset, etc.) are used with the radio. This port is used to detect an accessory PTT or auto sensing of a VOX accessory.

If VOX is programmed into the radio channel codeplug information, and PJ1 is high during power-up, the radio will activate VOX operation. If a low is present at port PJ1 during power-up, the radio will use this port as an external PTT indicator.

3.1.1.7 Microprocessor Power-Up, Power-Down and Reset Routine

On power-up, the microprocessor is held in reset until the digital 3.3 V regulator (U320 pin 5) provides a stable supply voltage. Once the digital supply reaches steady state and releases the reset line (U320 pin 7), the microprocessor begins to start up. The ASFIC_CMP (U451) has already started running and is providing the startup clock to the microprocessor. After reset release by all circuits, the software within the microprocessor begins executing port assignments, RAM checking, and initialization. A fixed delay of 100 ms is added to allow the audio circuitry to settle. Next, an alert beep is generated and the steady state software begins to execute (buttons are read, radio circuits are controlled).

When the radio is turned off, SWB+ is removed and port PE0 (U401 pin 67) goes low, initiating a power-down routine. Port PH3 (pin 44) remains high, keeping the voltage regulators on via Q493 and Q494, until the operating state of the radio has been stored in EEPROM. PH3 then goes low, and all regulated voltages are removed.

The microprocessor reset line (pin 94) can be controlled directly by the digital 3.3 V regulator (U320 pin 7), the microphone jack (part of accessory connector J471) via Q472 and Q471, and the microprocessor itself. U320 pulls the reset line low if the digital 3.3 V source loses regulation. This prevents possible MOS latch-up or overwriting of registers in the microprocessor because the reset line is higher in voltage than the microprocessor VDD ports (U401 pins 12, 39, 59, 88). The microprocessor can drive the reset line low if it detects a fault condition such as an expired watchdog timer, software attempting to execute an infinite loop, unplanned hardware inputs, static discharge, etc. Finally, the Q471 can pull the reset line low during use of the programming cable and CPS by the application of a sufficiently negative voltage to the microphone connector tip contact (J471 pin 4), however this reset method is not utilized.

3.1.1.8 Boot Mode Control

When power-up reset occurs, the microprocessor will boot into either normal or flash mode depending on the logic level of ports MODA (U401 pin 58) and MODB (pin 57). The Flash Adapter is a programming accessory which provides negative 9 volts dc via a 1K resistor to microphone connector J471 pin 4. This turns on Q471 and Q472 via D471 and VR472, pulling MODA and MODB low and allowing booting in the flash mode by cycling power to reset the radio. Software upgrades can then performed by loading the new software code into Flash ROM U404.

3.1.1.9 Microprocessor 7.3975 MHz Clock

The 7.3975 MHz clock signal (uP_CLK) is provided from the ASFIC_CMP (U451 pin 28). Upon startup the 16.8MHz crystal provides the signal to the ASFIC_CMP, which sends out the uP_CLK at 3.8MHz until a steady-state condition is reached and the clock is increased to 7.3975MHz for the microprocessor.

3.1.1.10 Battery Gauge

Various battery types are available having different capacities. The different battery types contain internal resistors connected from the BATT_CHARGE contact to ground (which is routed to the microprocessor as BATT_DETECT). A voltage divider is formed with R255 producing a different DC voltage for each battery type, which is read by microprocessor port PE2 (pin 65). This allows the software to recognize the battery chemistry being used and adjust the battery gauge for best accuracy.

3.1.2 Audio Circuitry

3.1.2.1 Transmit and Receive Low-Level Audio Circuitry

The majority of RX and TX audio processing is performed by U451, the Audio Filter IC (ASFIC_CMP), which provides the following functions:

- Tone PL/Digital PL encode and decode filtering
- Tone PL/Digital PL rejection filter in RX audio path
- TX pre-emphasis amplifier
- TX audio modulation limiter
- Post-limiter (splatter) filter
- TX deviation adjust (digitally-controlled attenuators)
- Programmable microphone gain attenuator
- RX audio volume control (digitally controlled attenuator)
- Carrier squelch adjustment (digitally controlled attenuator)
- Microprocessor output port expansion

- 2.5 V dc reference source
- Microprocessor clock generation (from the 16.8 MHz reference oscillator input)

The parameters of U451 that are programmable are selected by the microprocessor via the CLOCK (U451 pin 21), DATA (U451 pin 22) and chip enable (U451 pin 20) lines.

RX audio buffer U510 amplifies the audio level from the DEMOD output of the IFIC before being applied to the audio filter IC input (DISC, U451 pin 2). The buffer is DC coupled to avoid corruption of low-frequency data waveforms such as DPL. Because such waveforms are polarity sensitive, this buffer is configured as a single-stage inverting amplifier (U510-1 only) for VHF models where high-side first injection is used, or is configured as a two-stage non-inverting amplifier (U510-1 and -2) for UHF models using low-side first injection. The gain of the buffer is 1.5 times or 3.5 dB.

U480 and associated components are not used. Stage U480-1 is bypassed by jumper R487.

Volume adjustment is performed by a digital attenuator within U451. The volume control (10KO, part of S444) is connected to D_3.3 V and ground via R506 and R507. When the volume control is rotated, it varies the dc voltage applied to microprocessor A/D input port PE1 (U401 pin 66) between approximately 0 volts dc at minimum volume to 3.3 volts dc at maximum volume. Depending on this voltage, the appropriate setting of the digital volume attenuator is selected. This technique is less susceptible to noise than a conventional analog volume control.

3.1.2.2 Audio Power Amplifier

The audio power amplifier IC U490 amplifies receiver audio from U451 pin 41 to a level sufficient to drive a loudspeaker. U490 is a bridge amplifier delivering 3.46 volts rms between pins 5 and 8 without distortion, which is sufficient to develop 500 milliwatts of audio power into the internal 24 ohm speaker or an external 24 ohm load. The audio power amplifier is muted whenever speaker audio is not required to reduce current drain. The audio amp is muted when U451 pin 14 is low. When U451 pin 14 is high, U490 pin 1 is pulled low by Q490, enabling the audio amplifier.

Because the power amplifier is a bridge-type, neither speaker terminal is grounded. Care should be taken that any test equipment used to measure the speaker audio voltage does not ground either speaker output terminal, otherwise damage to the audio power amplifier IC may result. When a 24-ohm load resistor is used it should be connected between the tip and the sleeve of accessory jack J471 (3.5mm port), never to ground. External SPKR plug insertion mechanically disconnects the internal speaker. Voltage measurements using test equipment that is not isolated from ground may be made from one side of the speaker or load resistor (either the tip or the sleeve of J471) to chassis ground, in which case the voltage indicated will be one half of the voltage applied to the speaker or load resistor. The Motorola RLN4460 Portable Test Set and AAPMKN4004 Programming Test Cable provide the proper interface between the radio's ungrounded audio output and ground-referenced test equipment.

3.1.2.3 Internal Microphone Audio Voice Path

Microphone audio from internal microphone is routed from J470-1 via C475, L471, and C470 to the ASFIC_CMP mic audio input (MICINT, U451 pin 46). During transmit, Q470 is turned on by a low at U451 pin 35, providing dc bias for the internal MIC via R478. External MIC plug insertion mechanically disconnects the internal microphone. External MIC audio is coupled through L471 and C470 to the mic audio input. An input level of 10 mV at J471 pin 4 produces 200 mV at the output of U451 pin 40, which corresponds to 60% deviation.

3.1.2.4 PTT Circuits

The internal side-mounted PTT switch (S441) is sensed directly by microprocessor port PJ0 (U401 pin 71). External mic PTT is sensed by measuring the current drawn through the accessory connector (J471-4) by the mic cartridge (which is in series with the accessory PTT switch). This current is drawn through the base (pin 5) and emitter (pin 4) of a transistor in Q470, causing its collector (pin 3) to supply a logic-high to microprocessor port PJ1 (pin 72).

3.1.2.5 VOX Operation

VOX audio accessories do not have a PTT switch. Instead, the mic cartridge is wired directly from J471-4 to ground. If the radio has been programmed for VOX operation and the VOX accessory is plugged in prior to turning the radio on, the current drawn by the cartridge will turn on Q470 (pins 3-4-5) and a logic high will be seen at port PJ1 at turn-on. The microprocessor then assumes VOX operation, with PTT controlled by the presence of audio at the mic cartridge. A dc voltage proportional to the audio level at the input of the ASFIC_CMP (U451 pin 46) is fed to an A/D input of microprocessor U401 (pin 62). During VOX operation, PTT is activated when the dc level exceeds a preset threshold.

3.1.2.6 Battery Charging Through Microphone Jack

A wall-type charging power supply may be connected to the 2.5 mm microphone jack (part of accessory connector J451). The voltage present at the tip contact (pin 4) is applied to the center charging contact of the battery via diode D470. Another diode, internal to the battery, applies this voltage to the (+) battery terminal. Only the recommended charger and battery type should be charged in this manner.

Different battery types contain internal resistors connected from the BATT_CHARGE contact to ground, which is routed to the microprocessor as BATT_DETECT. A voltage divider is formed with R255 producing a DC voltage which is read by microprocessor port PE2 (pin 65). This allows the software to recognize the battery chemistry being used and adjust the battery gauge for best accuracy. The value of R255 is chosen so that the voltage at the BATT_CHARGE node (cathode of D470) is never low enough to turn on the EXT_MIC_PTT sense transistor (part of Q470).

3.1.2.7 Programming and Flashing Through Microphone Jack

The ring contact on the 2.5 mm microphone jack is used for reading, programming or re-flashing the radio using CPS. This contact (J471 pin 6) is routed to ports PD0_RXD (data into uP, pin 97) and PD1_TXD (data out of uP, pin 98). Transistor Q410 isolates the input and output functions by allowing PD1 to pull the line low, but does not affect incoming data from being read by port PD0.

To re-flash the radio (overwrite the software in the Flash ROM with new software), the radio must power up in the boot mode. This is accomplished by using a flash adapter accessory, which provides SCI communication with the programming ring contact (J471 pin 6) and also allows a negative voltage (negative 9 volts dc via a 1K resistor) to be applied to the tip contact (J471 pin 4). This voltage is sufficient to turn on the base-emitter junction (pins 1 and 2) of Q472 via L471, D471, VR472 and R471. Pin 6 of Q472 goes high, turning on Q471 (pins 3 and 4) and pulling the BOOT_ENA line (ports MODA and MODB of the microprocessor) low. Cycling power generates a reset which causes the radio to boot in the flash mode.

Chapter 4 136–162 MHz VHF Theory Of Operation

4.1 Introduction

This chapter provides a detailed theory of operation for the radio components. Schematic diagrams for the circuits described in the following paragraphs are located in Chapter 7 of this manual.

4.2 VHF Receiver

The VHF receiver covers the range of 136–162 MHz and provides switchable IF bandwidth for use with 12.5 kHz or 20/25 kHz channel spacing systems. The receiver is divided into two major blocks as shown in Figure 4-1.

- Front End
- Back End

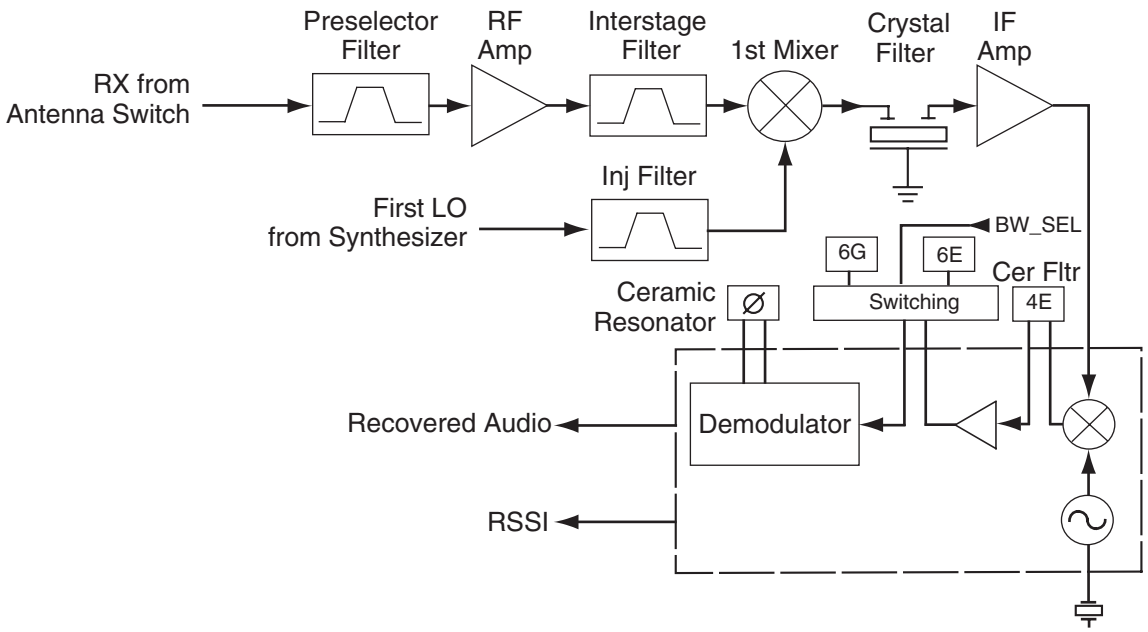


Figure 4-1. VHF Receiver Block Diagram

4.2.1 Receiver Front-End

Incoming RF signals from the antenna are first routed through the harmonic filter and antenna switch, part of the transmitter circuitry, before being applied to the receiver front end. The receiver front end consists of a preselector filter, RF amplifier, an interstage filter, and a double-balanced first mixer.

The preselector filter is a fixed-tuned 4-pole design using discrete elements (L1–L4 and C1–C9) in a series/shunt resonator configuration. It has a 3 dB bandwidth of 43 MHz, an insertion loss of 2 dB and image attenuation of 37 dB at 226 MHz, with increasing attenuation at higher frequencies. Diode CR1 protects the RF amplifier by limiting excessive RF levels.

The output of the filter is matched to the base of RF amplifier Q21, which provides 18 dB of gain and a noise figure of 2 dB. Operating voltage is obtained from the 5R source, which is turned off during transmit to reduce dissipation in Q21. Current mirror Q22 maintains the operating current of Q21

constant at 6.2 mA regardless of device and temperature variations, for optimum dynamic range and noise figure.

The output of the RF amplifier is applied to the interstage filter, a fixed-tuned 3-pole series-coupled resonator design having a 3 dB bandwidth of 54 MHz and insertion loss of 1.8 dB. This filter has an image rejection of 40 dB at 226 MHz, with increasing attenuation at higher frequencies.

The output of the interstage filter is connected to the passive double-balanced mixer consisting of components T41, T42, and CR41. This mixer has a conversion loss of 7 dB. High-side injection from the frequency synthesizer is filtered by L40–L41 and C40–C44 to remove second harmonic energy that may degrade half-IF spurious rejection performance. The injection filter has a 3 dB bandwidth of 52 MHz and an insertion loss of 1.5 dB. The filtered injection signal is applied to T42 at a level of +6 dBm.

The mixer output is applied to a diplexer network (L51–L52, C51, R51) which matches the 44.85 MHz IF signal to crystal filter FL51, and terminates the mixer into 50Ω at all other frequencies

4.2.2 Receiver Back-End

The receiver back end is a dual conversion design. High IF selectivity is provided by FL51, a 4-pole fundamental mode 44.85 MHz crystal filter with a minimum 3 dB bandwidth of + 6.7 kHz, a maximum 20 dB bandwidth of ±12.5 kHz, and a maximum insertion loss of 3.5 dB. The output is matched to IF amplifier stage Q51 by L53 and C93. Q51 provides 16 dB of gain and a noise figure of 1.8 dB. The dc operating current is 1 mA. The output of Q51 is applied to the input of the receiver IFIC U51. Diode CR51 limits the maximum RF level applied to the IFIC.

The IFIC is a low-voltage monolithic FM IF system incorporating a mixer/oscillator, two limiting IF amplifiers, quadrature detector, logarithmic received signal strength indicator (RSSI), voltage regulator and audio and RSSI op amps. The second LO frequency, 44.395 MHz, is determined by Y51. The second mixer converts the 44.85 MHz high IF frequency to 455 kHz.

Additional IF selectivity is provided by two ceramic filters, FL52 (between the second mixer and IF amp) and FL53 or FL54 (between the IF amp and the limiter input). The wider filter FL53 is used for 20/25 kHz channel spacing, and the narrower filter FL54 is used for 12.5 kHz channels. When the BW_SEL line is high, the two upper diodes in packages D51 and D52 are forward biased, selecting FL53 for 20/25 kHz channels. When the BW_SEL line is low, the two lower diodes in packages D51 and D52 are forward biased, selecting FL54 for 12.5 kHz channels.

	FL52	FL53	FL54
Number of Elements:	4	6	6
Insertion Loss:	4 dB	4 dB	4 dB
6 dB Bandwidth:	15 kHz	15 kHz	9 kHz
50 dB Bandwidth:	30 kHz	30 kHz	22 kHz
Stopband Rejection:	27 dB	47 dB	47 dB

Ceramic resonator Y70 provides phase vs. frequency characteristic required by the quadrature detector, with 90 degree phase shift occurring at 455 kHz. Buffer Q70 provides a lower driving impedance from the limiter to the resonator, improving the IF waveform and lowering the distortion of the recovered audio signal. The recovered audio level at the DEMOD output is 120 mV rms (25 kHz channel, 3 kHz deviation) or 60 mV rms (12.5 kHz channel, 1.5 kHz deviation). An additional RSSI output provides a DC voltage level that is proportional to RF signal level. This voltage is measured by an A/D converter contained in the microprocessor (PE4_AN4, U401 pin 63).

4.3 VHF Transmitter

The VHF transmitter covers the range of 136–162 MHz. Depending on model, the output power of the transmitter is either switchable on a per-channel basis between high power (5 watts) and low power (1 watt), or is factory preset to 2 watts. The transmitter is divided into four major blocks as shown in Figure 4-2.

- Power Amplifier
- Harmonic Filter
- Antenna Matching Network
- Power Control

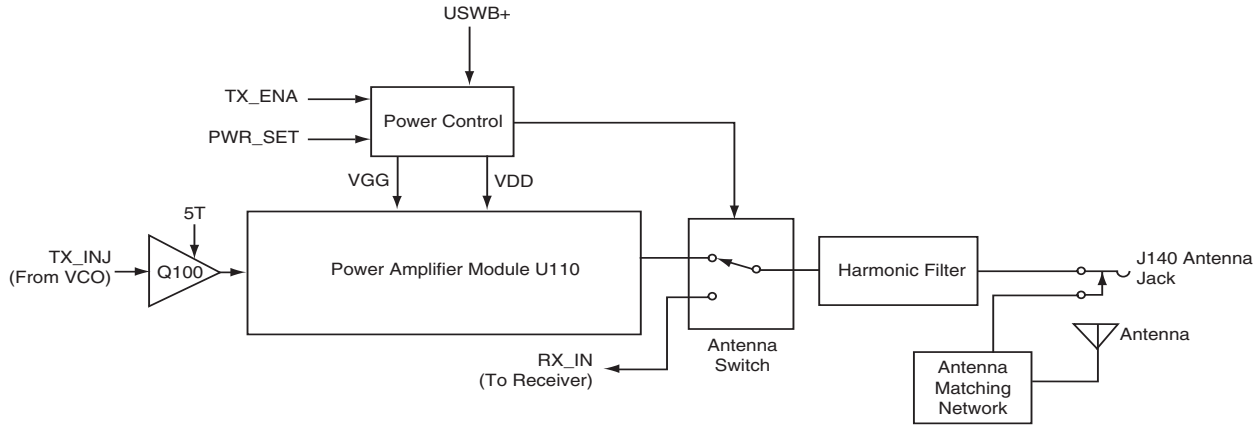


Figure 4-2. VHF Transmitter Block Diagram

4.3.1 Transmit Power Amplifier

The transmitter power amplifier has three stages of amplification. The first stage, Q100, operates in Class AB from the 5T source. It provides 13 dB of gain and an output of 20 mW. The current drain is typically 25mA. Components C105–C107 and L103 match the output of Q100 to the 50Ω input of the module U110.

U110 is a two stage Silicon MOS FET power amplifier module. Drain voltage is obtained from UNSW B+ after being routed through current-sense resistor R150 in the power control circuit. The output power of the module is controlled by varying the DC gate bias on U110 pin 2 (VGG).

4.3.2 Antenna Switch

The antenna switch consists of two pin diodes, D120 and D121. In the receive mode, both diodes are off. Signals applied at the antenna or at jack J140 are routed, via the harmonic filter, through network C122–C124 and L121, to the receiver input. In the transmit mode, Q170 is on and TXB+ is present, forward-biasing both diodes into conduction. The diode current is 50 mA, set by R120–R122. The transmitter RF from U110 is routed through D120, and via the harmonic filter to the antenna jack. D121 conducts, shunting RF power and preventing it from reaching the receiver. L121 is selected to appear as a 1/4 wave at VHF, so that the low impedance of D121 appears as a high impedance at the junction of D120 and the harmonic filter input. This provides a high series impedance and low shunt impedance divider between the power amplifier output and receiver input.

4.3.3 Harmonic Filter

The harmonic filter consists of components C130–C136 and L130–L132. The harmonic filter is a seven-pole elliptical low-pass configuration, optimized for low insertion loss, with a 3 dB frequency of approximately 180 MHz and typically less than 0.8 dB insertion loss in the passband.

4.3.4 Antenna Matching Network

The harmonic filter presents a 50 Ω impedance to antenna jack J140. A matching network, made up of C140–C141 and L140, is used to match the antenna impedance to the harmonic filter. This optimizes the performance of the transmitter and receiver into the impedance presented by the antenna, significantly improving the antenna's efficiency.

4.3.5 Power Control

The power control circuit is a dc-coupled amplifier whose output is the dc gate bias voltage (VGG) applied to the two stages of the RF power amplifier U110.

The output power of the transmitter is adjusted by varying the setting of the power-set DAC contained in the ASFICcmp IC (DACG, U451 pin 6). This PWR_SET voltage is applied to U150 pin 3.

Stage U150-2 compares the voltage drop across current sense resistor R150 to the voltage drop across resistor R151 caused by current flow through Q150, and adjusts its output (pin 7) to maintain equal voltages at pins 5 and 6. Thus the current flow through Q150, and hence its emitter voltage, is proportional to the current drawn by stage U110, which is in turn proportional to the transmitter output power. The emitter voltage of Q150 is applied to U150 pin 2, where it is compared to the power set voltage PWR_SET at pin 3.

The output of U150 pin 1 is divided by R110 and R111 and applied as a gate voltage to the power amplifier U110. By varying this gate voltage as needed to keep the voltages at U150 pins 2 and 3 equal, power is maintained at the desired setting. Excessive final current, for example due to antenna mismatch, causes a lowering of the voltage at U150 pin 6, an increased voltage at pin 2, and a lowering of the voltage at pin 1 and of the gate voltage VGG. This prevents damage to the final stage due to excessive current.

4.4 VHF Frequency Generation Circuitry

The frequency generation system, shown in Figure 4-3, is composed of two circuit blocks, the Fractional-N synthesizer IC U201, the VCO/Buffer IC U251, and associated circuitry. Figure 4-4 shows the peripheral interconnect and support circuitry used in the synthesizer block, and Figure 4-5 details the internal circuitry of the VCOBIC and its interconnections to the surrounding components. Refer to the schematic to identify reference designators.

The Fractional-N synthesizer is powered by regulated 5 V and 3 V provided by U310 and U330 respectively. 5 V is applied to U201 pins 13 and 30, and 3 V is applied to pins 5, 20, 34 and 36. The synthesizer in turn generates a super-filtered 4.5 V supply (VSF, from pin 28) to power U251. In addition to the VCO, the synthesizer also interfaces with the logic and ASFICcmp circuits. Programming for the synthesizer is accomplished through the microprocessor SPI_DATA_OUT, SPI_CLK, and SYNTH_CS (chip select) lines (U409 pins 100, 1 and 47 respectively). A logic high (3 V) from U201 pin 4 indicates to the microprocessor that the synthesizer is locked.

Transmit modulation from the ASFICcmp (U451 pin 40) is applied to U201 pin 10 (MOD_IN). An electronic attenuator in the ASFICcmp adjusts overall transmitter deviation by varying the audio level applied to the synthesizer IC. Internally the audio is digitized by the Fractional-N synthesizer and applied to the loop divider to provide the low-port modulation. The audio is also routed through an internal attenuator for the purpose of balancing the low port and high port modulation and reducing the deviation by 6 dB for 12.5 kHz channels, and is available at U201 pin 41 (VCO_MOD). This audio signal is routed to the VCO's modulator.

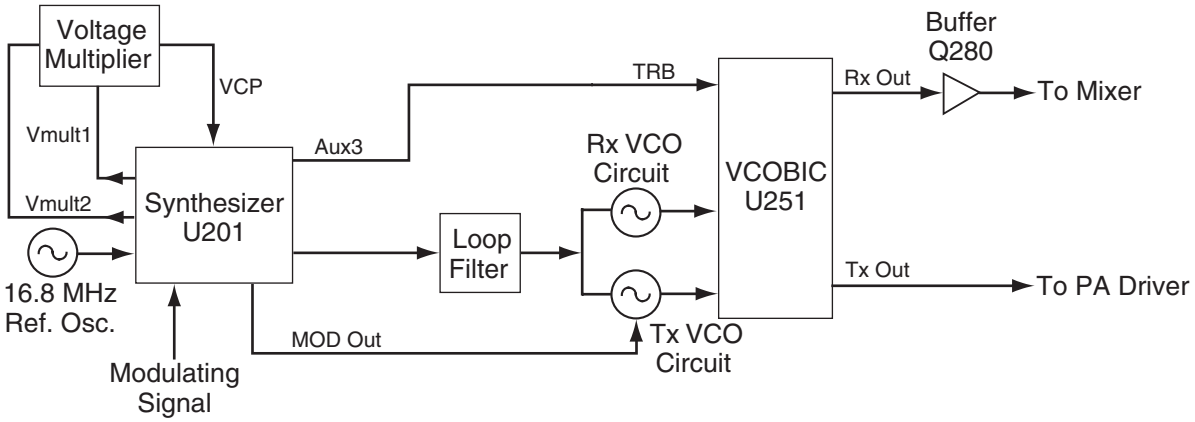


Figure 4-3. VHF Frequency Generation Unit Block Diagram

4.4.1 Fractional-N Synthesizer

The Fractional-N synthesizer, shown in Figure 4-4, uses a 16.8 MHz crystal (Y201) to provide the reference frequency for the system. External components C201–C203, R202 and D201 are also part of the temperature-compensated oscillator circuit. The dc voltage applied to varactor D201 from U201 pin 25 is determined by a temperature-compensation algorithm within U201, and is specific to each crystal Y201, based on a unique code assigned to the crystal that identifies its temperature characteristics. Stability is better than 2.5 ppm over temperatures of -30 to 60 °C. Software-programmable electronic frequency adjustment is achieved by an internal DAC which provides a frequency adjustment voltage from U201 pin 25 to varactor D201.

The synthesizer IC U201 further divides the 16.8 MHz signal to 2.1 MHz, 2.225 MHz, or 2.4 MHz for use as reference frequencies. It also provides a buffered 16.8 MHz signal at U201 pin 19 for use by the ASFICcmp.

To achieve fast locking of the synthesizer, an internal adapt charge pump provides higher current at U201 pin 45 to quickly force the synthesizer within lock range. The required frequency is then locked by the normal mode charge pump at pin 43. A loop filter (C243–C245 and R243–R245) removes noise and spurs from the steering voltage applied to the VCO varactors, with additional filtering located in the VCO circuit.

Both the normal and adapt charge pumps get their supply from the capacitive voltage multiplier made up of C221–C224 and D220–D221. Two 3 V square waves from U201 pins 14–15 provide the drive signals for the voltage multiplier, which generates 12.1 V at U201 pin 47. This voltage is filtered by C225–C228.

One of the auxiliary outputs of the synthesizer IC (AUX3, U201 pin 2) provides the TRB signal which determines the operating mode of the VCO, either receive or transmit.

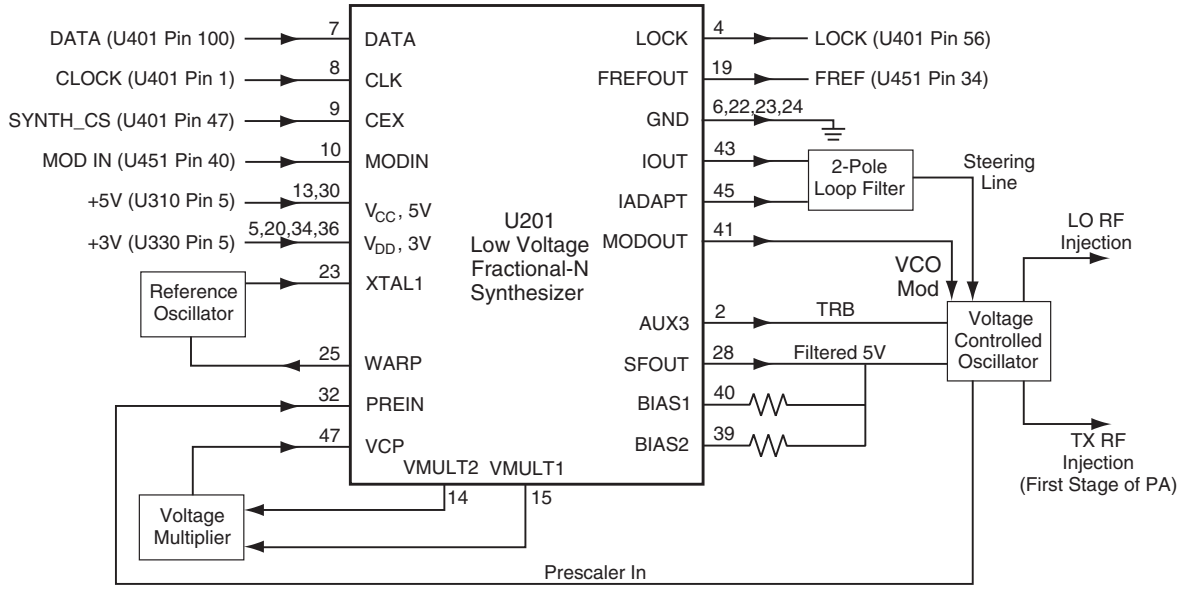


Figure 4-4. VHF Synthesizer Block Diagram

4.4.2 Voltage Controlled Oscillator (VCO)

The VCOBIC (U251), shown in Figure 4-5, in conjunction with the Fractional-N synthesizer (U201) generates RF in both the receive and the transmit modes of operation. The TRB line (U251 pin 19) determines which oscillator and buffer are enabled. A sample of the RF signal from the enabled oscillator is routed from U251 pin 12 through a low pass filter, to the prescaler input of the synthesizer IC (U201 pin 32). After frequency comparison in the synthesizer, a resultant DC control voltage is used to steer the VCO frequency. When the PLL is locked on frequency, this voltage can vary between 3 V and 9 V. L251 and C251 further attenuate noise and spurs on the steering line voltage.

In the receive mode, the TRB line (U251 pin 19) is low. This activates the receive VCO and the receive buffer of U251, which operate within the range of 180.85 to 206.85 MHz. The VCO frequency is determined by tank inductor L254, C253–C257, and varactor D251. The buffered RF signal at U251 pin 8 is further amplified by Q280 and applied as RX_INJ to the low-pass injection filter in the receiver front end circuit.

In the transmit mode, U251-19 is driven high by U201 pin 2, enabling the transmit VCO and buffer. The 136–162 MHz RF signal from U251 pin 10 is applied as TX_INJ to the input of the transmitter circuit via matching network C290–C291 and L291. TX VCO frequency is determined by L264,

C263–C267, and varactor D261. High-port audio modulation from the synthesizer IC is applied as VCO_MOD to varactor D262 which modulates the transmit VCO.

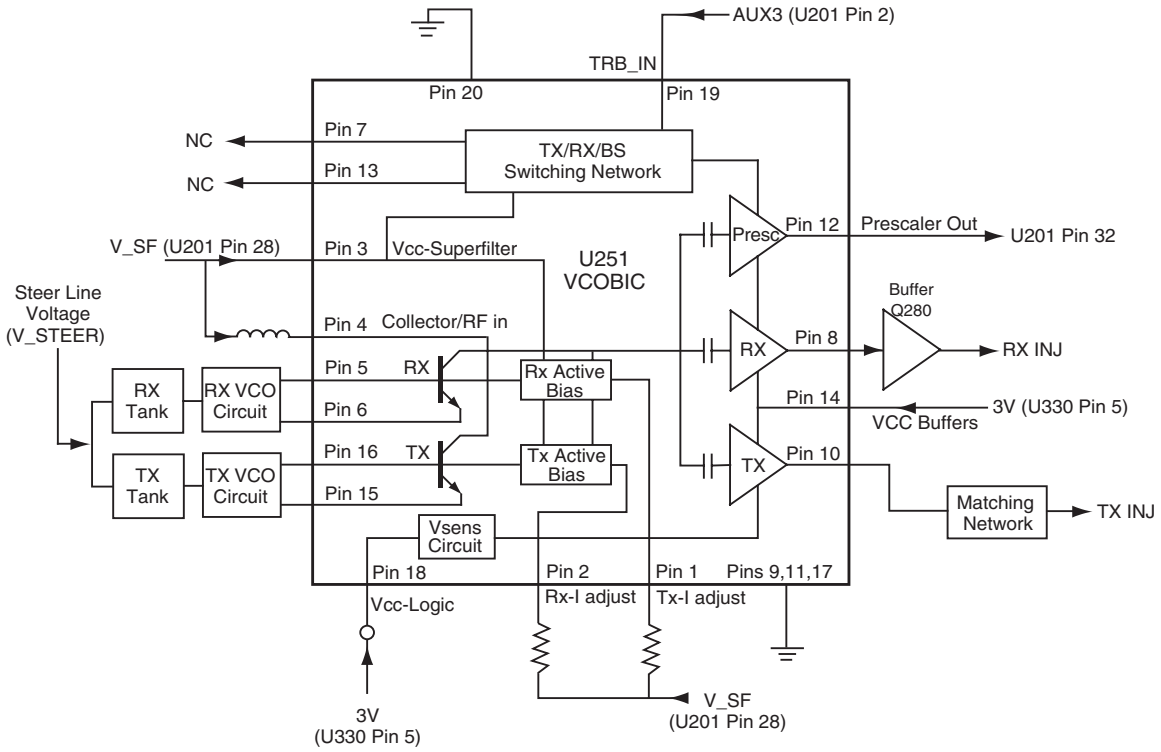


Figure 4-5. VHF VCO Block Diagram

Notes

Chapter 5 146–174 MHz VHF Theory Of Operation

5.1 Introduction

This chapter provides a detailed theory of operation for the radio components. Schematic diagrams for the circuits described in the following paragraphs are located in Chapter 7 of this manual.

5.2 VHF Receiver

The VHF receiver covers the range of 146–174 MHz and provides switchable IF bandwidth for use with 12.5 kHz or 20/25 kHz channel spacing systems. The receiver is divided into two major blocks as shown in Figure 5-1.

- Front End
- Back End

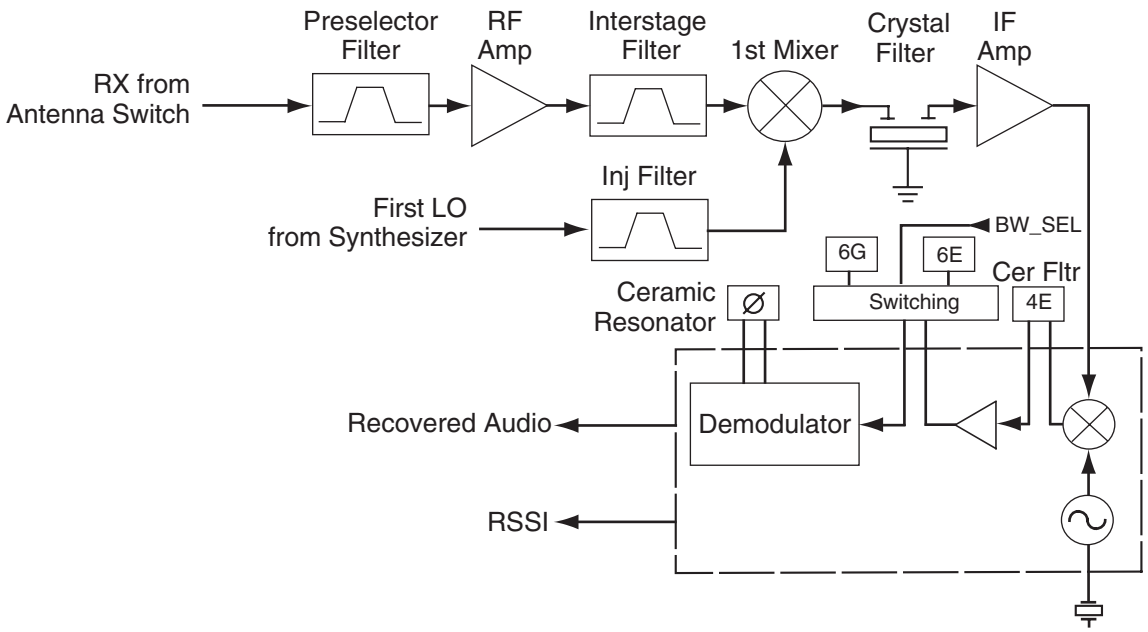


Figure 5-1. VHF Receiver Block Diagram

5.2.1 Receiver Front-End

Incoming RF signals from the antenna are first routed through the harmonic filter and antenna switch, part of the transmitter circuitry, before being applied to the receiver front end. The receiver front end consists of a preselector filter, RF amplifier, an interstage filter, and a double-balanced first mixer.

The preselector filter is a fixed-tuned 4-pole design using discrete elements (L1–L4 and C1–C9) in a series/shunt resonator configuration. It has a 3 dB bandwidth of 44 MHz, an insertion loss of 2 dB and image attenuation of 40 dB at 235 MHz, with increasing attenuation at higher frequencies. Diode CR1 protects the RF amplifier by limiting excessive RF levels.

The output of the filter is matched to the base of RF amplifier Q21, which provides 18 dB of gain and a noise figure of 2 dB. Operating voltage is obtained from the 5R source, which is turned off during transmit to reduce dissipation in Q21. Current mirror Q22 maintains the operating current of Q21

constant at 6.2 mA regardless of device and temperature variations, for optimum dynamic range and noise figure.

The output of the RF amplifier is applied to the interstage filter, a fixed-tuned 3-pole series-coupled resonator design having a 3 dB bandwidth of 58 MHz and insertion loss of 1.8 dB. This filter has an image rejection of 42 dB at 235 MHz, with increasing attenuation at higher frequencies.

The output of the interstage filter is connected to the passive double-balanced mixer consisting of components T41, T42, and CR41. This mixer has a conversion loss of 7 dB. High-side injection from the frequency synthesizer is filtered by L40–L41 and C40–C44 to remove second harmonic energy that may degrade half-IF spurious rejection performance. The injection filter has a 3 dB bandwidth of 52 MHz and an insertion loss of 1.5 dB. The filtered injection signal is applied to T42 at a level of +6 dBm.

The mixer output is applied to a diplexer network (L51–L52, C51, R51) which matches the 44.85 MHz IF signal to crystal filter FL51, and terminates the mixer into 50Ω at all other frequencies

5.2.2 Receiver Back-End

The receiver back end is a dual conversion design. High IF selectivity is provided by FL51, a 4-pole fundamental mode 44.85 MHz crystal filter with a minimum 3 dB bandwidth of + 6.7 kHz, a maximum 20 dB bandwidth of ±12.5 kHz, and a maximum insertion loss of 3.5 dB. The output is matched to IF amplifier stage Q51 by L53 and C93. Q51 provides 16 dB of gain and a noise figure of 1.8 dB. The dc operating current is 1 mA. The output of Q51 is applied to the input of the receiver IFIC U51. Diode CR51 limits the maximum RF level applied to the IFIC.

The IFIC is a low-voltage monolithic FM IF system incorporating a mixer/oscillator, two limiting IF amplifiers, quadrature detector, logarithmic received signal strength indicator (RSSI), voltage regulator and audio and RSSI op amps. The second LO frequency, 44.395 MHz, is determined by Y51. The second mixer converts the 44.85 MHz high IF frequency to 455 kHz.

Additional IF selectivity is provided by two ceramic filters, FL52 (between the second mixer and IF amp) and FL53 or FL54 (between the IF amp and the limiter input). The wider filter FL53 is used for 20/25 kHz channel spacing, and the narrower filter FL54 is used for 12.5 kHz channels. When the BW_SEL line is high, the two upper diodes in packages D51 and D52 are forward biased, selecting FL53 for 20/25 kHz channels. When the BW_SEL line is low, the two lower diodes in packages D51 and D52 are forward biased, selecting FL54 for 12.5 kHz channels.

	FL52	FL53	FL54
Number of Elements:	4	6	6
Insertion Loss:	4 dB	4 dB	4 dB
6 dB Bandwidth:	15 kHz	15 kHz	9 kHz
50 dB Bandwidth:	30 kHz	30 kHz	22 kHz
Stopband Rejection:	27 dB	47 dB	47 dB

Ceramic resonator Y70 provides phase vs. frequency characteristic required by the quadrature detector, with 90 degree phase shift occurring at 455 kHz. Buffer Q70 provides a lower driving impedance from the limiter to the resonator, improving the IF waveform and lowering the distortion of the recovered audio signal. The recovered audio level at the DEMOD output is 120 mV rms (25 kHz channel, 3 kHz deviation) or 60 mV rms (12.5 kHz channel, 1.5 kHz deviation). An additional RSSI output provides a DC voltage level that is proportional to RF signal level. This voltage is measured by an A/D converter contained in the microprocessor (PE4_AN4, U401 pin 63).

5.3 VHF Transmitter

The VHF transmitter covers the range of 146–174 MHz. Depending on model, the output power of the transmitter is either switchable on a per-channel basis between high power (5 watts) and low power (1 watt), or is factory preset to 2 watts. The transmitter is divided into four major blocks as shown in Figure 5-2.

- Power Amplifier
- Harmonic Filter
- Antenna Matching Network
- Power Control

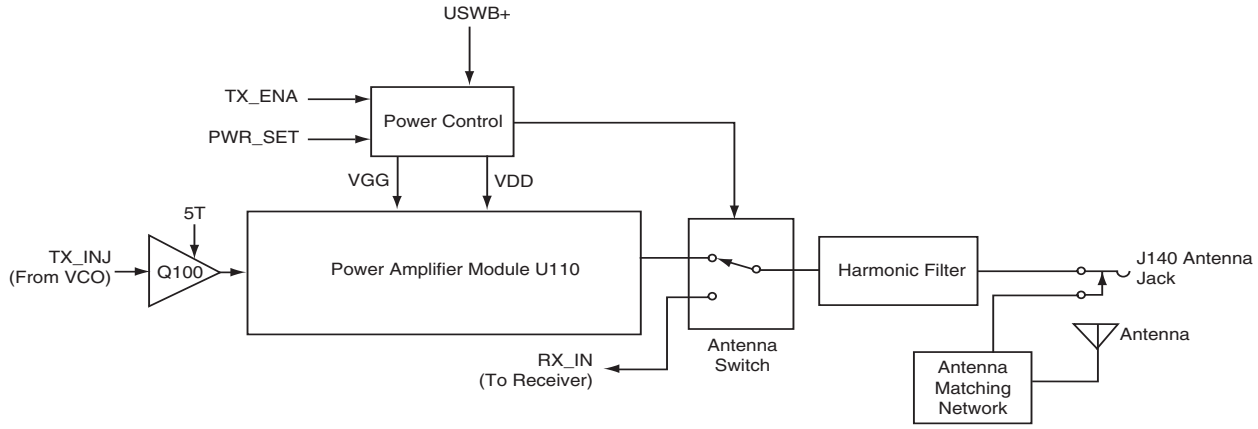


Figure 5-2. VHF Transmitter Block Diagram

5.3.1 Transmit Power Amplifier

The transmitter power amplifier has three stages of amplification. The first stage, Q100, operates in Class AB from the 5T source. It provides 13 dB of gain and an output of 20 mW. The current drain is typically 25mA. Components C105–C107 and L103 match the output of Q100 to the 50Ω input of the module U110.

U110 is a two stage Silicon MOS FET power amplifier module. Drain voltage is obtained from UNSW B+ after being routed through current-sense resistor R150 in the power control circuit. The output power of the module is controlled by varying the DC gate bias on U110 pin 2 (VGG).

5.3.2 Antenna Switch

The antenna switch consists of two pin diodes, D120 and D121. In the receive mode, both diodes are off. Signals applied at the antenna or at jack J140 are routed, via the harmonic filter, through network C122–C124 and L121, to the receiver input. In the transmit mode, Q170 is on and TXB+ is present, forward-biasing both diodes into conduction. The diode current is 50 mA, set by R120–R122. The transmitter RF from U110 is routed through D120, and via the harmonic filter to the antenna jack. D121 conducts, shunting RF power and preventing it from reaching the receiver. L121 is selected to appear as a 1/4 wave at VHF, so that the low impedance of D121 appears as a high impedance at the junction of D120 and the harmonic filter input. This provides a high series impedance and low shunt impedance divider between the power amplifier output and receiver input.

5.3.3 Harmonic Filter

The harmonic filter consists of components C130–C136 and L130–L132. The harmonic filter is a seven-pole elliptical low-pass configuration, optimized for low insertion loss, with a 3 dB frequency of approximately 210 MHz and typically less than 0.8 dB insertion loss in the passband.

5.3.4 Antenna Matching Network

The harmonic filter presents a 50 Ω impedance to antenna jack J140. A matching network, made up of C140–C141 and L140, is used to match the antenna impedance to the harmonic filter. This optimizes the performance of the transmitter and receiver into the impedance presented by the antenna, significantly improving the antenna's efficiency.

5.3.5 Power Control

The power control circuit is a dc-coupled amplifier whose output is the dc gate bias voltage (VGG) applied to the two stages of the RF power amplifier U110.

The output power of the transmitter is adjusted by varying the setting of the power-set DAC contained in the ASFICcmp IC (DACG, U451 pin 6). This PWR_SET voltage is applied to U150 pin 3.

Stage U150-2 compares the voltage drop across current sense resistor R150 to the voltage drop across resistor R151 caused by current flow through Q150, and adjusts its output (pin 7) to maintain equal voltages at pins 5 and 6. Thus the current flow through Q150, and hence its emitter voltage, is proportional to the current drawn by stage U110, which is in turn proportional to the transmitter output power. The emitter voltage of Q150 is applied to U150 pin 2, where it is compared to the power set voltage PWR_SET at pin 3.

The output of U150 pin 1 is divided by R110 and R111 and applied as a gate voltage to the power amplifier U110. By varying this gate voltage as needed to keep the voltages at U150 pins 2 and 3 equal, power is maintained at the desired setting. Excessive final current, for example due to antenna mismatch, causes a lowering of the voltage at U150 pin 6, an increased voltage at pin 2, and a lowering of the voltage at pin 1 and of the gate voltage VGG. This prevents damage to the final stage due to excessive current.

5.4 VHF Frequency Generation Circuitry

The frequency generation system, shown in Figure 5-3, is composed of two circuit blocks, the Fractional-N synthesizer IC U201, the VCO/Buffer IC U251, and associated circuitry. Figure 5-4 shows the peripheral interconnect and support circuitry used in the synthesizer block, and Figure 5-5 details the internal circuitry of the VCOBIC and its interconnections to the surrounding components. Refer to the schematic to identify reference designators.

The Fractional-N synthesizer is powered by regulated 5 V and 3 V provided by U310 and U330 respectively. 5 V is applied to U201 pins 13 and 30, and 3 V is applied to pins 5, 20, 34 and 36. The synthesizer in turn generates a super-filtered 4.5 V supply (VSF, from pin 28) to power U251. In addition to the VCO, the synthesizer also interfaces with the logic and ASFICcmp circuits. Programming for the synthesizer is accomplished through the microprocessor SPI_DATA_OUT, SPI_CLK, and SYNTH_CS (chip select) lines (U409 pins 100, 1 and 47 respectively). A logic high (3 V) from U201 pin 4 indicates to the microprocessor that the synthesizer is locked.

Transmit modulation from the ASFICcmp (U451 pin 40) is applied to U201 pin 10 (MOD_IN). An electronic attenuator in the ASFICcmp adjusts overall transmitter deviation by varying the audio level applied to the synthesizer IC. Internally the audio is digitized by the Fractional-N synthesizer and applied to the loop divider to provide the low-port modulation. The audio is also routed through an internal attenuator for the purpose of balancing the low port and high port modulation and reducing the deviation by 6 dB for 12.5 kHz channels, and is available at U201 pin 41 (VCO_MOD). This audio signal is routed to the VCO's modulator.

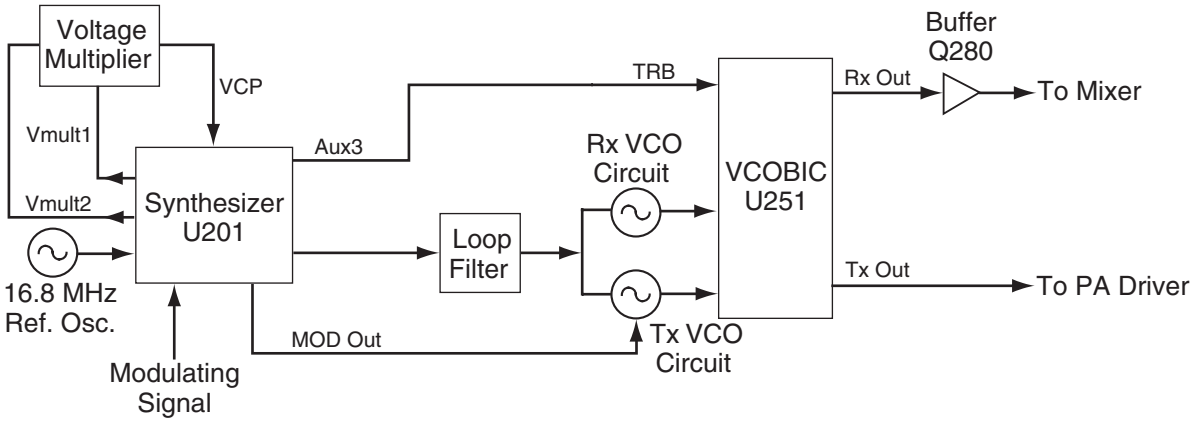


Figure 5-3. VHF Frequency Generation Unit Block Diagram

5.4.1 Fractional-N Synthesizer

The Fractional-N synthesizer, shown in Figure 5-4, uses a 16.8 MHz crystal (Y201) to provide the reference frequency for the system. External components C201–C203, R202 and D201 are also part of the temperature-compensated oscillator circuit. The dc voltage applied to varactor D201 from U201 pin 25 is determined by a temperature-compensation algorithm within U201, and is specific to each crystal Y201, based on a unique code assigned to the crystal that identifies its temperature characteristics. Stability is better than 2.5 ppm over temperatures of -30 to 60 °C. Software-programmable electronic frequency adjustment is achieved by an internal DAC which provides a frequency adjustment voltage from U201 pin 25 to varactor D201.

The synthesizer IC U201 further divides the 16.8 MHz signal to 2.1 MHz, 2.225 MHz, or 2.4 MHz for use as reference frequencies. It also provides a buffered 16.8 MHz signal at U201 pin 19 for use by the ASFICcmp.

To achieve fast locking of the synthesizer, an internal adapt charge pump provides higher current at U201 pin 45 to quickly force the synthesizer within lock range. The required frequency is then locked by the normal mode charge pump at pin 43. A loop filter (C243–C245 and R243–R245) removes noise and spurs from the steering voltage applied to the VCO varactors, with additional filtering located in the VCO circuit.

Both the normal and adapt charge pumps get their supply from the capacitive voltage multiplier made up of C221–C224 and D220–D221. Two 3 V square waves from U201 pins 14–15 provide the drive signals for the voltage multiplier, which generates 12.1 V at U201 pin 47. This voltage is filtered by C225–C228.

One of the auxiliary outputs of the synthesizer IC (AUX3, U201 pin 2) provides the TRB signal which determines the operating mode of the VCO, either receive or transmit.

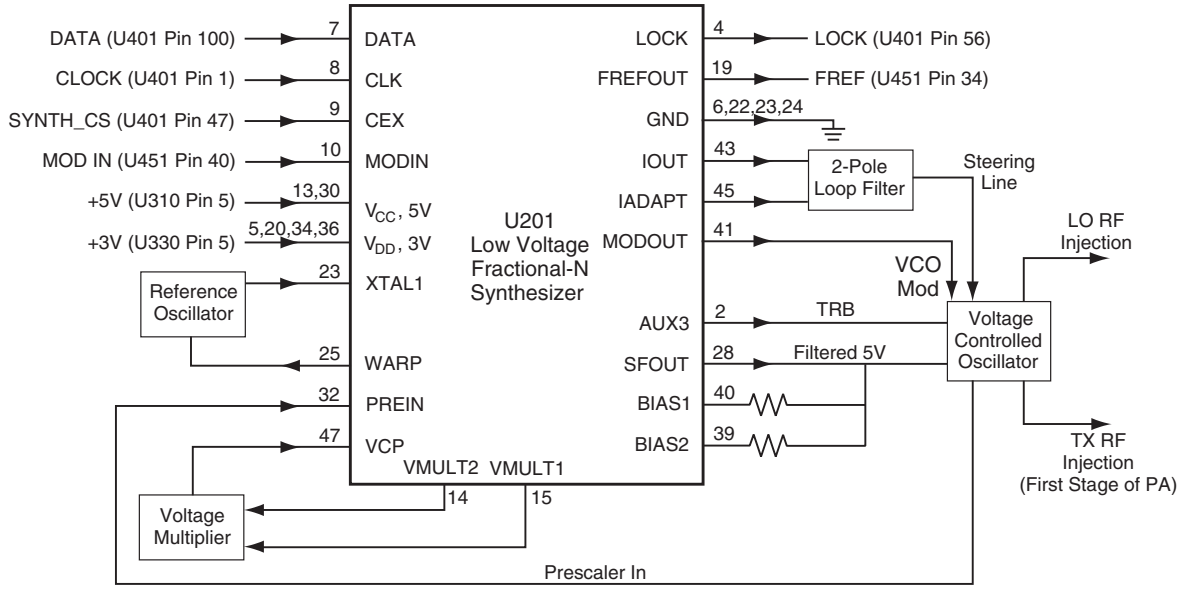


Figure 5-4. VHF Synthesizer Block Diagram

5.4.2 Voltage Controlled Oscillator (VCO)

The VCOBIC (U251), shown in Figure 5-5, in conjunction with the Fractional-N synthesizer (U201) generates RF in both the receive and the transmit modes of operation. The TRB line (U251 pin 19) determines which oscillator and buffer are enabled. A sample of the RF signal from the enabled oscillator is routed from U251 pin 12 through a low pass filter, to the prescaler input of the synthesizer IC (U201 pin 32). After frequency comparison in the synthesizer, a resultant DC control voltage is used to steer the VCO frequency. When the PLL is locked on frequency, this voltage can vary between 3 V and 9 V. L251 and C251 further attenuate noise and spurs on the steering line voltage.

In the receive mode, the TRB line (U251 pin 19) is low. This activates the receive VCO and the receive buffer of U251, which operate within the range of 190.85 to 218.85 MHz. The VCO frequency is determined by tank inductor L254, C253–C257, and varactor D251. The buffered RF signal at U251 pin 8 is further amplified by Q280 and applied as RX_INJ to the low-pass injection filter in the receiver front end circuit.

In the transmit mode, U251-19 is driven high by U201 pin 2, enabling the transmit VCO and buffer. The 146–174 MHz RF signal from U251 pin 10 is applied as TX_INJ to the input of the transmitter circuit via matching network C290–C291 and L291. TX VCO frequency is determined by L264, C263–C267, and varactor D261. High-port audio modulation from the synthesizer IC is applied as VCO_MOD to varactor D262 which modulates the transmit VCO.

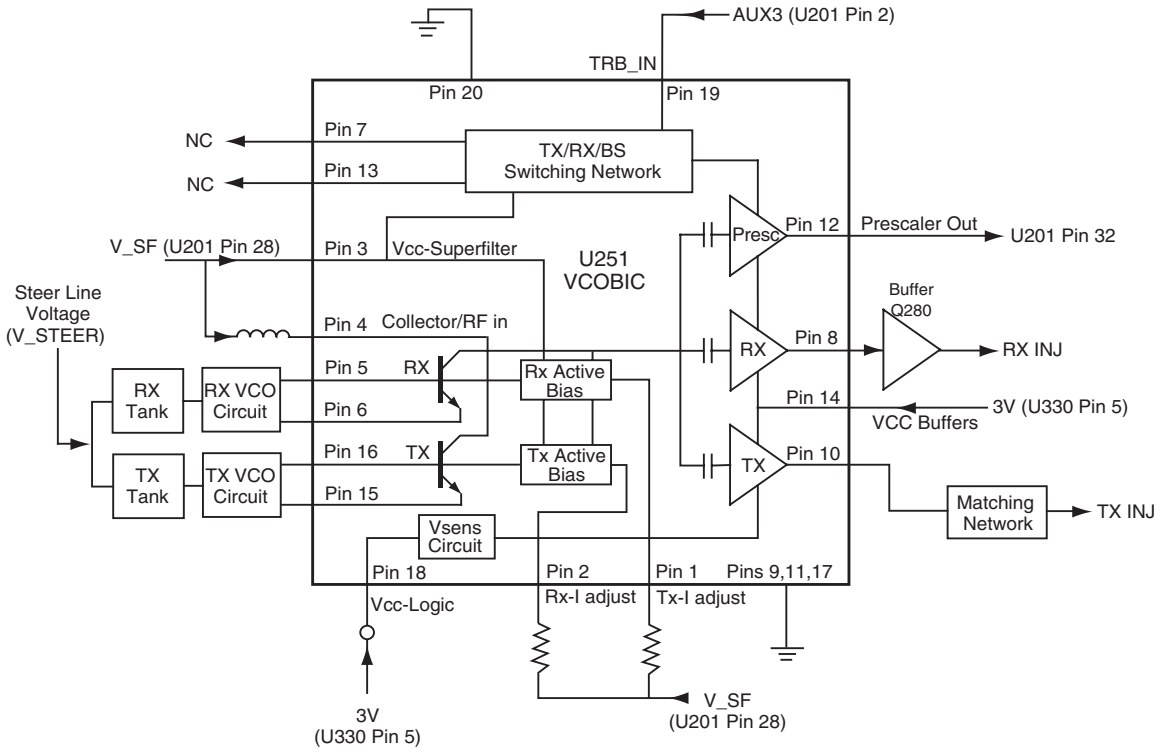


Figure 5-5. VHF VCO Block Diagram

Notes

Chapter 6 VHF Troubleshooting Tables

6.1 Troubleshooting Table for Receiver

Table 6-1. Troubleshooting Table for Receiver

Symptom	Possible Causes	Procedure	Corrective Action
Radio Dead (no turn-on beep, no LED indication)	1. Battery dead or defective.	Substitute known good battery or battery eliminator.	Charge or replace battery.
	2. Defective battery contacts.	Inspect battery contacts for corrosion or bent terminals.	Clean/repair/replace J301.
	3. Blown fuse	Check voltage on each side of fuse. If blown, 0 VDC after fuse.	Check for short on output, check D301, VR301, troubleshoot/repair as needed, replace fuse.
	4. DC switching fault	Verify battery voltage present at S444 pin 5 when radio is on. Verify Q494-1 is at least 1 V dc, Q494-6 is ~0.1 V dc, Q493-3 is at Vbatt.	Check/replace on-off-volume control S444. Troubleshoot/replace Q493/4.
	5. Microprocessor not starting up.	Verify clock input to U401-90 (EXTAL) is 7.3975 MHz using high impedance probe. If clock is 3.8 MHz, check for shorts on U401 pins. Connect RIB to verify communication via CPS. Verify U401-94 (RESET) is high.	Verify 16.8 MHz signal at U451-34. If OK, troubleshoot/ replace U451. If not present, troubleshoot U201 Synthesizer. Reprogram/reflash as needed. If RESET is Low, troubleshoot regulator U320. Check for shorts at U401 pins. Replace U401 (depot only). Reprogram/ reflash as needed.
	6. Regulator fault	Verify U310-5 is 5 V dc, U320-5 is 3.3 V dc, U330-5 is 3 V dc.	Check for shorts on outputs, troubleshoot/repair as needed, replace faulty regulator.

Table 6-1. Troubleshooting Table for Receiver (Continued)

Symptom	Possible Causes	Procedure	Corrective Action
No Audio	1. Synthesizer out of lock	Verify U201-4 is at 3 V dc.	Troubleshoot synthesizer/VCO circuits.
	2. Defective IFIC	Verify audio is present at U51-8.	Check Q70, Y70, U51.
	3. RX audio buffer fault	Verify audio is present at U451-2.	Check U510 and associated parts.
	4. ASFIC fault	Verify audio is present at U451-41. Verify U451-14 is high.	Check squelch setting, PL/DPL programming. Troubleshoot/ replace U451.
	5. Audio PA fault	Verify U490-1 is <0.2 V dc. Verify audio is present at U490-5 and 8.	Check Q490. Check/replace U490.
	6. Defective speaker	Verify audio is present at speaker terminals.	If not, check continuity of J471-2 and 3. Check J491. If yes, replace speaker.
No Receive (squelch noise present)	1. No first injection	Check that RF level at T42-6 is approx +6 dBm. Check that RF level at U251-8 is at least -8 dBm.	Check injection filter C40–44, L40–41. If yes, check Q280 and associated parts. If no, check U251 and components on pins 5 and 6.
	2. No 5R source.	Verify U401-49 is high in RX. Verify Q311 gate is 0 V dc in RX Verify Q311 drain is 5 V dc in RX.	Check/replace U401 Check/replace Q313. Check for shorts, check/replace Q311.
	3. Harmonic filter or antenna switch fault	Apply on-channel 100 mV RF signal at antenna port. Verify RF level at jct. C1/C2 per schematic.	Check TX harmonic filter, D120–121. Should be 0 V dc on D120–121.
	4. Back end fault	Apply on-channel 100 mV RF signal at antenna port. Measure RF levels from FL51 through U51.	Check components prior to loss-of-signal point.
	5. No second injection	Measure RF level at U51-3, verify approx. 280 mV rms.	If dc voltages at U51-3 and 4 are OK, check Y51 and associated parts. If not replace U51.

6.2 Troubleshooting Table for Synthesizer

Table 6-2. Troubleshooting Table for Synthesizer

Symptom	Possible Causes	Procedure	Corrective Action
Synthesizer Out of Lock (RX mode only)	1. VCO fault	Verify oscillator is working, check RF level at U251-10 per schematic. Check dc voltages at U251 pin 2 through 6 and 10 per Table 6-4. Verify steering line voltage is between ~3 V and 10 V.	Check VCO tank components connected to U251-5 and 6. Check for shorts/opens, replace U251. Check D251 and associated components.
	2. Synthesizer fault	Verify TRB line (from U201-2 to U251-19) is low in RX mode	Check for shorts, check U201 voltages per Table 6-4, replace U201 if incorrect.
	3. Programming fault	Verify RX channel programming is correct.	Re-program if necessary.
Synthesizer Out of Lock (TX mode only)	1. VCO fault	Verify oscillator is working, check RF level at U251-10 per schematic. Check dc voltages at U251 pins 1,3,4,10,15,16 per Table 6-4. Verify steering line voltage is between ~3 V and 10 V.	Check VCO tank components connected to U251-15 and 16. Check for shorts/opens, replace U251. Check D261 and associated components.
	2. Synthesizer fault	Verify TRB line (U201-2 to U251-19) is high (3 V) in TX mode	Check for shorts, check U201 voltages per Table 6-4, replace U201 if incorrect.
	3. Programming fault	Verify TX channel programming is correct.	Re-program if necessary.
Synthesizer Out of Lock (RX and TX modes)	1. VCO fault	Check that RF level at U251-12 is at least 150 mV (VHF) or -12 to -20 dBm (UHF)	If low/missing, check L276, C276-7, R276.
	2. Synthesizer fault	Check that RF level at U201-32 is at least 150 mV (VHF) or -12 to -20 dBm (UHF). Verify steering line voltage is between ~3 V and 10 V.	If correct, check/replace U201. If incorrect, check R248 and C241. Check loop filter components R243-5 and C243-5.
	3. DC voltage fault	Verify 4.5 V dc at U201-28. Verify 12.1 V dc at U201-47	Check C231-233, etc., for shorts. If OK check/replace U201. Check for 3 V 1.05 MHz sq waves at U201-14 and 15. Check C218–228, D220–221.
	4. Programming fault	Verify channel programming is correct.	Re-program if necessary.

6.3 Troubleshooting Table for Transmitter

Table 6-3. Troubleshooting Table for Transmitter

Symptom	Possible Causes	Procedure	Corrective Action
No Transmit (no TX LED indication)	1. PTT switch defective.	Verify U401-71 goes low when PTT is pressed.	Replace PTT switch S441.
	2. EXT MIC PTT fault	Verify U401-72 goes low when J471-4 is grounded.	Check/replace Q470, L471 etc.
No Transmit (TX LED indication OK)	1. Synthesizer out of lock	Refer to Table 6-2.	Refer to Table 6-2.
	2. No TX_ENABLE	Verify U401-50 is high when pin 71 or 72 is low.	Check/replace U401.
	3. TX DC switch fault	Verify Q171-C is 0 V in TX. Verify Q170-C is at Vbatt in TX.	Replace Q171. Check for shorts, replace Q170.
	4. Power control fault	Check Q150 and U150 dc voltages per schematic and Table 6-4.	Repair/replace defective components
	5. No TX injection	Check that RF level at jct. R100/ R101 per schematic.	Check U251, L291–292, C290–291.
	6. No 5T source	Verify Q312 gate is 0 V dc in TX Verify Q312 drain is 5 V dc in TX.	Check/replace Q313. Check for shorts, check/replace Q312.
	7. TX gain stage failure	Check RF levels at Q100 and U110 per schematic.	Troubleshoot Q100/U110 and associated circuitry.
	8. Antenna switch failure	Verify dc voltage at jct. R122/L120 is approx 1.5 V.	Check/replace D120–121, L120–121, R120–122, etc.

Table 6-3. Troubleshooting Table for Transmitter (Continued)

Symptom	Possible Causes	Procedure	Corrective Action
Low Power	1. Low TX injection	Check that RF level at jct. R100/ R101 per schematic.	Check U251, L291–292, C290–291.
	2. Low gain in TX stage	Verify dc voltage at Q100-E is ~1.3 V (VHF) or ~0.5 V (UHF). Verify that RF level at U110-1 is approx. 1 V (VHF) or 1.6 V (UHF).	Verify 5T voltage is correct. Troubleshoot Q100 circuitry. Troubleshoot Q100 circuitry. Check/replace Q100.
	3. Incorrect control voltage	Verify that the dc voltage at PWR_SET (R162) is approx 1.8 V dc (at 1 watt) to 2.6 V dc (at 4–5 watts). Verify that the dc voltage at U110-2 is approx 2–3 V dc (at 1 watt) to 3–4 V dc (at 4–5 watts). (See schematic.)	Check programming. Trouble-shoot controller circuitry. Check/ replace U451. Troubleshoot U150, Q150 and associated circuitry.
	4. Antenna switch defect	Verify dc voltage at jct. R122/L120 (VHF) or R121/L120 (UHF) is approx 1.7 V. *Note: Do not attempt to measure RF or DC voltages at the diodes. Damage to test equipment may occur.*	Check/replace D120–121, L120–121, R120–122, etc.
	5. Harmonic filter defect	Visually inspect components C130–137, L130–132. Check dc continuity of L130–132 *in RX mode only*.	Repair/replace if necessary.
Poor TX range, conducted power OK	1. RF test jack defective	Verify continuity of J140 pins 3 and 4 *in RX mode only*.	Replace J140.
	2. Antenna matching network fault	Visually inspect components C140–141, L140 or L141. Check dc continuity of L140 or L141 *in RX mode only*.	Repair/replace if necessary.
	3. Defective or wrong antenna	Verify correct antenna is installed. Try another antenna.	Replace antenna.
No internal mic audio (EXT MIC audio OK)	1. Mic bias fault	Verify U451-35 is low when side PTT is pressed. Verify Q470-6 is high when side PTT button is pressed.	Check/replace U451. Check/replace R474, R476, and Q470.
	2. Defective mic	Verify approx 1.8 V dc across cartridge when side PTT button is pressed. Verify audio present (~10 mV rms) when speaking into mic.	Check mic connector and R478. Replace mic cartridge.
	3. Defective mic jack	Verify continuity between J471 pins 4 and 5.	Replace J471.

Table 6-3. Troubleshooting Table for Transmitter (Continued)

Symptom	Possible Causes	Procedure	Corrective Action
No EXT MIC audio	1. Mic bias fault	Verify approx 1.8 V dc across EXT MIC cartridge in TX mode. Verify audio present (~10 mV rms) when speaking into mic.	Check Q470. R475, R477, L471. Check VR473, VR475, D470 for shorts.
	2. Audio path fault	Verify mic audio present (~10 mV rms) at U451-46. Verify amplified mic audio present (~200 mV rms) at U451-40.	Check L471, C470. Check/replace U451.
	3. Defective audio accessory	Try another accessory.	Replace defective accessory.

6.4 Troubleshooting Table for Board and IC Signals

Table 6-4. Troubleshooting Table for Board and IC Signals

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U51 IFIC	1	RF input 44.85 MHz	1.20	
	2	RF input decoupling	1.20	
	3	2nd LO osc output	4.02	
	4	2nd LO osc input	4.60	
	5	RSSI output	0.74	(no signal received)
	6	Vcc	4.70	
	7	Audio feedback	0.89	
	8	Audio output	1.44	DEMOD to stage U510
	9	RSSI feedback	0.74	(no signal received)
	10	Quad detector input	2.22	
	11	Limiter output	1.25	
	12	Limiter decoupling 2	1.30	
	13	Limiter decoupling 1	1.30	
	14	Limiter input	1.28	
	15	Ground	GND	
	16	IF amp output	1.22	
	17	IF amp decoupling 2	1.26	
	18	IF amp input	1.26	
	19	IF amp decoupling 1	1.26	
	20	2nd mixer output	3.09	
U52 BW Select Switch	1	Inverter 1 input	0	(25 kHz mode)
	2	Inverter 2 output	0	(25 kHz mode)
	3	Inverter 3 input (NU)	GND	
	4	Ground	GND	
	5	Inverter 3 output (NU)	4.96	
	6	Inverter 2 input	3.00	(25 kHz mode)
	7	Inverter 1 output	4.95	(25 kHz mode)
	8	Vcc	4.96	

Table 6-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U110 RF Power Amp	1	RF input	0	(TX mode)
	2	Vgg (gate bias)	2.65 (typ)	(TX mode) (4.25 V typ at VHF)
	3	Vdd	6.59	(TX mode)
	4	RF output	–	Do not measure
	5	Ground	GND	
U150 Dual Opamp	1	Unit 1 output	4.20 (typ)	(TX mode) (5.8 V typ at VHF)
	2	Unit 1 (-) input	2.39 (typ)	(TX mode)
	3	Unit 1 (+) input	2.39 (typ)	(TX mode)
	4	Ground	GND	
	5	Unit 2 (+) input	3.30 (typ)	(TX mode)
	6	Unit 2 (-) input	3.35 (typ)	(TX mode)
	7	Unit 2 output	2.23 (typ)	(TX mode)
	8	Vcc	6.79	(TX mode)
U201 Freq Synthesizer	1	AUX2 output (NU)	0	
	2	AUX3 output (TRB)	0.03	To U251-19 (RX mode)
	3	AUX4 output (NU)	0	
	4	Lock detect output	2.98	To U401-56
	5	PD Vdd	2.98	
	6	Digital ground	GND	
	7	Serial data input	3.23	
	8	Serial clock input	0	
	9	Synth chip select	3.23	From U401-47
	10	Modulation input	1.50	From U451-40
	11	VMULT4 (NU)	2.98	
	12	VMULT3 (NU)	0	
	13	VRO	4.96	
	14	VMULT2	1.49	
	15	VMULT1	1.49	
	16	INDMULT (NU)	0	
	17	NC1	0	
	18	Ref select (NU)	0	
	19	Buffered 16.8 MHz out	1.54	
	20	Analog Vdd	3.00	
	21	V bypass (NU)	1.55	
	22	Analog ground	GND	
	23	Ref osc XTAL1	2.07	

Table 6-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U201 Freq Synthesizer	24	Ref osc XTAL2	0	
	25	Ref osc warp output	3.00	
	26	Superfilter cap	4.48	
	27	Superfilter base (NU)	3.76	
	28	Superfilter output	4.52	
	29	NC2	0	
	30	Superfilter input	4.96	
	31	NC3	0	
	32	Prescaler input	1.97	
	33	Prescaler ground	GND	
	34	Prescaler Vdd	2.99	
	35	Prescaler Vref (NU)	1.97	
	36	Digital Vdd	2.99	
	37	TEST1 (NU)	0.01	
	38	TEST2 (NU)	0	
	39	Bias 2	3.38 (typ)	(1.34 V in TX mode)
	40	Bias 1	1.50 (typ)	(3.20 V in TX mode)
	41	Modulation output	3.42 (typ)	(1.62 V typ in TX mode)
	42	CCOMP (NU)	0.05	
	43	Steering line IOUT	9.62 (typ)	Depends on frequency
	44	PD ground	GND	
	45	Steering line IADAPT	9.62 (typ)	Depends on frequency
	46	Adapt switch (NU)	0	
	47	Voltage from charge pump	12.8	
	48	AUX1 output (NU)	2.98	
U251 VCO / Buffer	1	TX VCO current adjust	4.50	
	2	RX VCO current adjust	4.35	
	3	Superfiltered input	4.51	
	4	Collector RF in amp	4.35	
	5	RX VCO base	1.27	
	6	RX VCO emitter	0.48	
	7	RX switch output (NU)	0	
	8	RX buffered VCO output	3.36	
	9	GND_FLAG	GND	
	10	TX buffered VCO output	3.36	
	11	GND_BUFFERS	GND	

Table 6-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U251 VCO / Buffer	12	Prescaler output	2.26	
	13	TX switch output (NU)	0.06	
	14	Vcc_BUFFERS	3.00	
	15	TX VCO emitter	0	(RX mode)
	16	TX VCO base	0	(RX mode)
	17	GND_LOGIC	GND	
	18	Vcc_LOGIC	3.00	
	19	TRB input	0.03	From U201-2 (RX mode)
	20	FLIP input	GND	
U310 5 V Regulator	1	Vin	7.48	
	2	Ground	GND	
	3	Control input	7.48	
	4	Bypass capacitor	1.26	
	5	Vout	4.96	
U320 3.3 V Regulator	1	Ground	GND	
	2	Feedback	1.23	
	3	Tap (NU)	0	
	4	Vin	7.48	
	5	Vout	3.23	
	6	Sense (NU)	0	
	7	Error (reset output)	3.20	
	8	Shutdown input	7.48	
U330 3 V Regulator	1	Vin	7.48	
	2	Ground	GND	
	3	Control input	7.48	
	4	Bypass capacitor	1.26	
	5	Vout	3.00	
U401 Microprocessor	1	PD4_SCK serial clock input	0	
	2	PD5_SS	3.23	ASFIC chip select
	3	PD6_VLIN	3.23	EEPROM chip select
	4	PG7_R_W	3.21	
	5	PG6_AS	3.23	
	6	PG0_XA13	3.23	
	7	PB7_ADDR15	0.026	
	8	PB6_ADDR14	0.028	
	9	PB3_ADDR11	3.06	

Table 6-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U401 Microprocessor	10	PB1_ADDR9	3.05	
	11	PB2_ADDR10	0.16	
	12	VDD	3.23	
	13	VSS	GND	
	14	PBO_ADDR8	3.05	
	15	PB5_ADDR13	0.13	
	16	PG1_XA14	0.20	
	17	PG4_XA17	3.17	
	18	PG5_XA18	0	
	19	PG3_XA16	3.21	
	20	PG2_XA15	0.30	
	21	PB4_ADDR12	0.22	
	22	PF7_ADDR7	3.03	
	23	PF6_ADDR6	3.08	
	24	PF5_ADDR5	3.06	
	25	PF4_ADDR4	0.16	
	26	PF3_ADDR3	0.26	
	27	PF2_ADDR2	3.06	
	28	PF1_ADDR1	3.06	
	29	PFO_ADDR0	3.05	
	30	PC0_DATA0	0.69	
	31	PC1_DATA1	0.96	
	32	PC2_DATA2	1.10	
	33	PC3_DATA3	0.81	
	34	PC4_DATA4	0.62	
	35	PC5_DATA5	0.68	
	36	PC6_DATA6	0.67	
	37	PC7_DATA7	0.73	
	38	PH7_CSPROG	3.05	
	39	VDDL	3.23	
	40	VSSL	GND	
	41	PH6_CSGP2	3.23	
	42	PH5_CSGP1	3.23	
	43	PH4_CSIO	0	
	44	PH3_PW4	3.21	On/off control output
	45	PH2_PW3	0	

Table 6-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U401 Microprocessor	46	PH1_PW2	3.00	
	47	PH0_PW1	3.23	Synth chip select
	48	XIRQ	3.00	
	49	PI7	1.48	RX enable
	50	PI6	0.01	TX enable
	51	PI5	3.23	
	52	PI4	0	Green LED enable
	53	PI3	0	Red LED enable
	54	PI2	0	
	55	PI1	0	
	56	PI0	2.98	Lock detect from U201-4
	57	MODB_VSTBY	3.22	Boot mode enable
	58	MODA_LIR	3.12	
	59	AVDD	3.23	
	60	PE7_AN7	3.20	
	61	PE6_AN6	3.20	
	62	PE5_AN5	2.91	VOX threshold detect
	63	PE4_AN4	0.73	RSSI input
	64	PE3_AN3	0.14	
	65	PE2_AN2	1.62	
	66	PE1_AN1	0 – 3.3 V	Volume control wiper
	67	PE0_AN0	2.48	33% of battery voltage
	68	VRL	0	
	69	VRH	3.20	
	70	AVSS	GND	
	71	PJ0_CSGP3	3.23	Side PTT button
	72	PJ1_CSGP4	0	External MIC PTT
	73	PJ2	3.23	
	74	PJ3	3.23	
	75	PJ4	3.23	
	76	PJ5	0	
	77	PJ6	3.23	Bottom option button
	78	PJ7	3.23	Top option button
	79	PA0_IC3	0	
	80	PA1_IC2	1.57	
	81	PA2_IC1	3.00	

Table 6-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U401 Microprocessor	82	PA3_IC4_OC5_OC1	3.00	
	83	PA4_OC4_OC1	0	Squelch detect input
	84	PA5_OC3_OC1	0	Channel activity input
	85	PA6_OC2_OC1	0	
	86	PA7_PA1_OC1	0	
	87	VSSR	GND	
	88	VDDR	3.23	
	89	ECLK (NU)	1.60	
	90	EXTAL	1.70	Clock from U451-28
	91	XTAL	1.40	Not used
	92	VDDSYN	0	
	93	XFC (NU)	0	
	94	RESET	3.20	From U320
	95	LVOUT	0	
	96	IRQ	3.20	
	97	PD0_RXD	3.23	
	98	PD1_TXD	1.9	
	99	PD2_MISO	0	
	100	PD3_MOSI	3.23	
U402 EEPROM	1	Chip select	3.23	From U401-3
	2	Serial data out	0	
	3	Write protect	3.23	
	4	Vss	GND	
	5	Serial data in	3.23	
	6	Serial clock	0	
	7	Hold	3.23	
	8	Vcc	3.23	
U404 Flash ROM	1	A11	3.06	
	2	A9	3.08	
	3	A8	3.05	
	4	A13	0.13	
	5	A14	0.31	
	6	NC	3.17	
	7	EN_WE	3.21	From U401-4
	8	Vcc	3.23	
	9	RESET	3.20	

Table 6-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U404 Flash ROM	10	A16	3.17	
	11	A15	0.30	
	12	A12	0.22	
	13	A7	3.03	
	14	A6	3.08	
	15	A5	3.06	
	16	A4	0	
	17	A3	0.24	
	18	A2	3.08	
	19	A1	3.05	
	20	A0	3.05	
	21	D0	0.69	
	22	D1	0.94	
	23	D2	1.08	
	24	GND	GND	
	25	D3	0.78	
	26	D4	0.59	
	27	D5	0.66	
	28	D6	0.67	
	29	D7	0.75	
	30	EN_CE	3.01	From U401-38
	31	A10	0.16	
	32	EN_OE	0	From U401-86
U451 ASFIC_CMP	1	VDD for analog circuits	3.00	
	2	DISC audio input	1.34	From U510
	3	Ground for analog circuits	GND	
	4	DACU output	0	
	5	DACR output	0	
	6	DACG output	2.38 (typ)	Power set (TX mode)
	7	VOX peak detector output	2.91	
	8	PLCAP for DC integrator	0.40	
	9	SQIN	0.01	
	10	Universal audio input/output	0	
	11	VDD for DACs	4.95	
	12	SQCAP	0	
	13	GCB2 general purpose output	0	Audio PA_EN (unsquelched)

Table 6-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U451 ASFIC_CMP	14	GCB1 general purpose output	0	
	15	GCB0 general purpose output	3.00	BW select (25 kHz mode)
	16	Squelch channel activity output	0	To U401-84
	17	Squelch detect digital output	0	To U401-83
	18	PL/low speed data I/O	1.50	
	19	High speed data I/O	3.00	
	20	Chip select	3.23	From U401-2
	21	Serial clock input	0	
	22	Serial data input	3.23	
	23	Ground for clock synthesizer	GND	
	24	Loop filter cap for clock syn	0.74	
	25	PLCAP2 for LS integrator	1.17	
	26	Not used	0	
	27	Vdd for clock synthesizer	3.00	
	28	Clock synthesizer output	1.70	
	29	1200 Hz ref for MDC decode	3.00	
	30	GNDDO	GND	
	31	Ground for digital circuits	GND	
	32	Vdd for analog switches	4.96	
	33	Vdd for digital circuits	3.00	
	34	16.8 MHz master clock input	1.54	
	35	GCB3 general purpose output	3.00	Internal MIC enable
	36	TX audio return from option	0	
	37	GCB4 general purpose output	0	
	38	GCB5 general purpose output	0	
	39	RX audio send to option	1.48	
	40	Modulation output	1.50	To U201-10
	41	RX audio out to power amp	1.51	
	42	Flat TX audio return from option	0.20	
	43	RX audio return to option	1.50	
	44	Flat TX audio send to option	1.50	
	45	Vdd for audio path I/O filters	3.00	
	46	Mic audio input	1.50	
	47	Ground for audio path I/O filters	GND	
	48	Ext mic audio input (not used)	0	

Table 6-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U480 Dual Opamp	1	Unit 1 output	2.48	
	2	Unit 1 (-) input	2.48	
	3	Unit 1 (+) input	2.46	
	4	Ground	GND	
	5	Unit 2 (+) input	0.28	
	6	Unit 2 (-) input	0.29	
	7	Unit 2 output	0	
	8	Vcc	4.96	
U490 Audio Power Amp	1	Enable/shutdown	0.12	(Unsquelched)
	2	Bias reference	3.26	(Unsquelched)
	3	(+) input	3.26	(Unsquelched)
	4	(-) input	3.27	(Unsquelched)
	5	(-) output	3.25	(Unsquelched)
	6	Vcc	7.48	(Unsquelched)
	7	Ground	GND	
	8	(+) output	3.29	(Unsquelched)
U510 Dual Opamp	1	Unit 1 output	1.75	
	2	Unit 1 (-) input	1.56	
	3	Unit 1 (+) input	1.55	
	4	Ground	GND	
	5	Unit 2 (+) input	1.55	
	6	Unit 2 (-) input	1.56	
	7	Unit 2 output	1.38	
	8	Vcc	4.96	

1. All voltages are measured with a high-impedance digital voltmeter and expressed in volts DC relative to ground (0 V).
2. Voltages are measured with a DC input voltage of 7.50 + .02 volts DC applied to the battery connector (J301).
3. All voltages are measured in the squelched receive mode, unless otherwise indicated.
4. Voltages are identical for VHF and UHF models unless otherwise indicated.

Chapter 7 VHF Schematic Diagrams, Overlays, and Parts Lists

7.1 Introduction

This section provides schematic diagrams, overlays, and parts lists for the radio circuit boards and interface connections.

7.1.1 Notes For All Schematics and Circuit Boards

* Component is frequency sensitive. Refer to the Electrical Parts List for value and usage.

1. Unless otherwise stated, resistance values are in ohms (K = 1000), capacitance values are in picofarads (pF) or microfarads (µF), and inductance values are in nanohenries (nH) or microhenries (µH).
2. DC voltages are measured from point indicated to chassis ground using a Motorola DC multimeter or equivalent. If the board has been removed from the chassis, the transmitter module mounting screws may be used for ground connection. (*Note: The antenna nut bracket is not connected to ground.*) Operating mode dependent voltages are followed by (RX) for receive mode, (TX) for transmit mode, (UNSQ) for unsquelched mode, etc.
3. RF voltages on VHF models are measured with a Fluke model 85 RF probe. The indicated voltages expressed in mV (RF) are DC level readings which correspond approximately 1:1 to the RF voltage level in mV rms. RF voltages in the Receiver Front End and Receiver Back End circuits are measured with an on-channel 100 mV (-7 dBm) RF signal applied to the antenna jack J140.
4. RF voltages on UHF models are measured both with a high-impedance RF voltmeter having a bandwidth in excess of 500 MHz (levels are expressed in dBm) and with a Fluke model 85 RF probe [levels are expressed in mV (RF)]. These indicated voltages are DC level readings which correspond approximately 1:1 to the RF voltage level in mV rms, and are only approximate for UHF frequency measurements. RF voltages in the Receiver Front End and Receiver Back End circuits are measured with an on-channel 100 mV (-7 dBm) RF signal applied to the antenna jack J140.
5. Audio voltages are measured with a high-impedance AC rms voltmeter. The indicated voltages are expressed in mV rms. Receive mode voltages are followed by (RX) and are measured with an on-channel signal with 1 kHz modulation at 60% deviation (3 kHz for 25 kHz channels, or 1.5 kHz for 12.5 kHz channels). Transmit mode voltages are followed by (TX) and are measured with a 1 kHz, 10 mV rms signal present at the external microphone input (accessory connector J471 pin 4 hot and pin 7 ground).

6. Reference Designators are assigned in the following manner:

Ref. No. Series	Circuit Block
1–99	RF Front End
100–149	Transmitter RF Stages
150–200	Transmitter Power Control
201–250	Frequency Synthesizer
251–300	VCO
301–400	DC Regulation
401–450	Microprocessor
451–550	Audio

7. Circuit Block Interconnection Legend:

Name	Description
USWB+	Unswitched Battery Voltage (always on)
5V	5 volts (regulated)
5R	5 volts in RX mode only
5T	5 volts in TX mode only
RESET	Low-line reset signal from U320 to uP
D3_3V	Digital 3.3 volts (regulated)
3V	Analog 3 volts (regulated)
TX_ENA	Transmit enable signal from uP to transmitter
PWR_SET	DC voltage from ASFIC to TX power control
DEMOD	RX audio from backend to ASFIC
BW_SEL	Backend filter BW select from ASFIC
RSSI	RX signal strength indication from IFIC to uP
IF_IN/OUT	44.85 MHz from 1st mixer to high IF filter
RF_IN/OUT	RX signal from antenna switch to front end
MOD OUT/IN	TX modulation from ASFIC to synthesizer
16_8_MHZ	Ref osc signal from synthesizer to ASFIC
SYNTH_CS	Synthesizer chip select from uP
SPI_CLK	Serial clock from uP
SPI_DATA_OUT	Serial data from uP
LOCK	Lock detect indication from synth to uP
PRESC	VCO freq feedback from VCOBIC to synth
V_STEER	Steering line voltage from synth to VCO's
V_SF	Super-filtered 4.5 volts from synth to VCOBIC
VCO_MOD	TX modulation from ASFIC to synthesizer

Name	Description
TRB	TX/RX control from synth to VCOBIC
RX_INJ	Buffered RX VCO output to RX 1st mixer
TX_INJ	TX VCO output to transmitter input

7.1.2 Six Layer Circuit Board

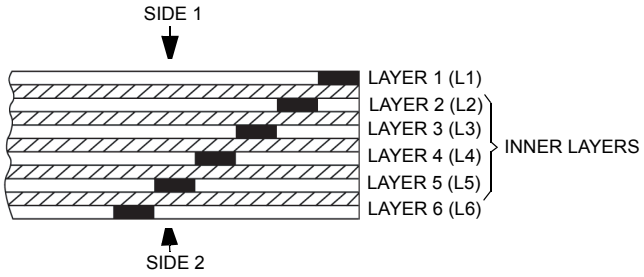


Figure 7-1. Six-Layer Circuit Board: Copper Steps in Layer Sequence

7.2 Speaker and Microphone Schematic

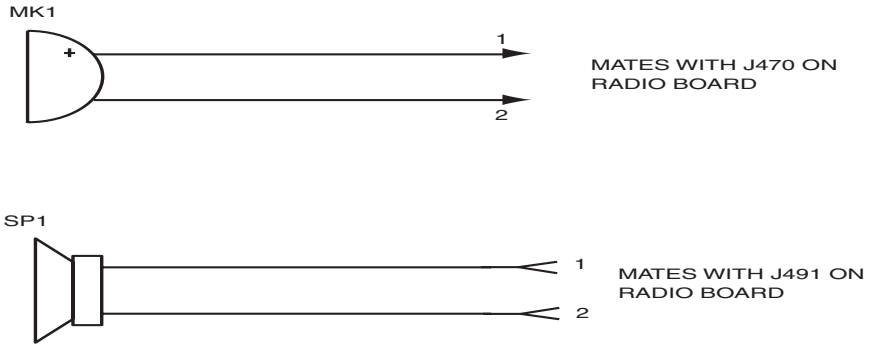


Figure 7-2. Speaker and Microphone Schematic

7.2.1 Speaker and Microphone Parts List

Reference Designator	Motorola Part No.	Description
MK1	5080258E16	Microphone, electret
SP1	5005679X04	Speaker assembly with connector

Notes

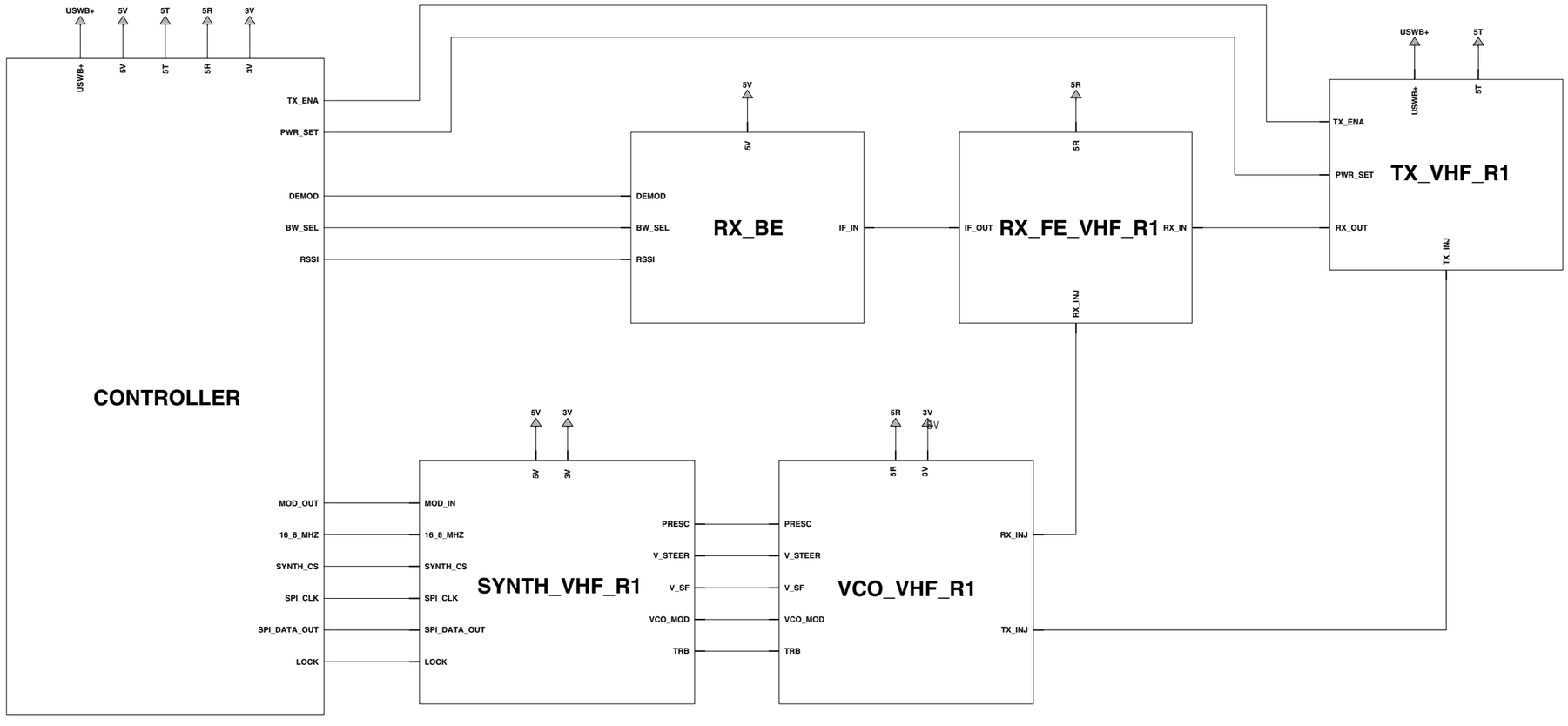


Figure 7-3. VHF (136–162 MHz) Radio Circuit Block Interconnect Diagram (8486769Z02-A)

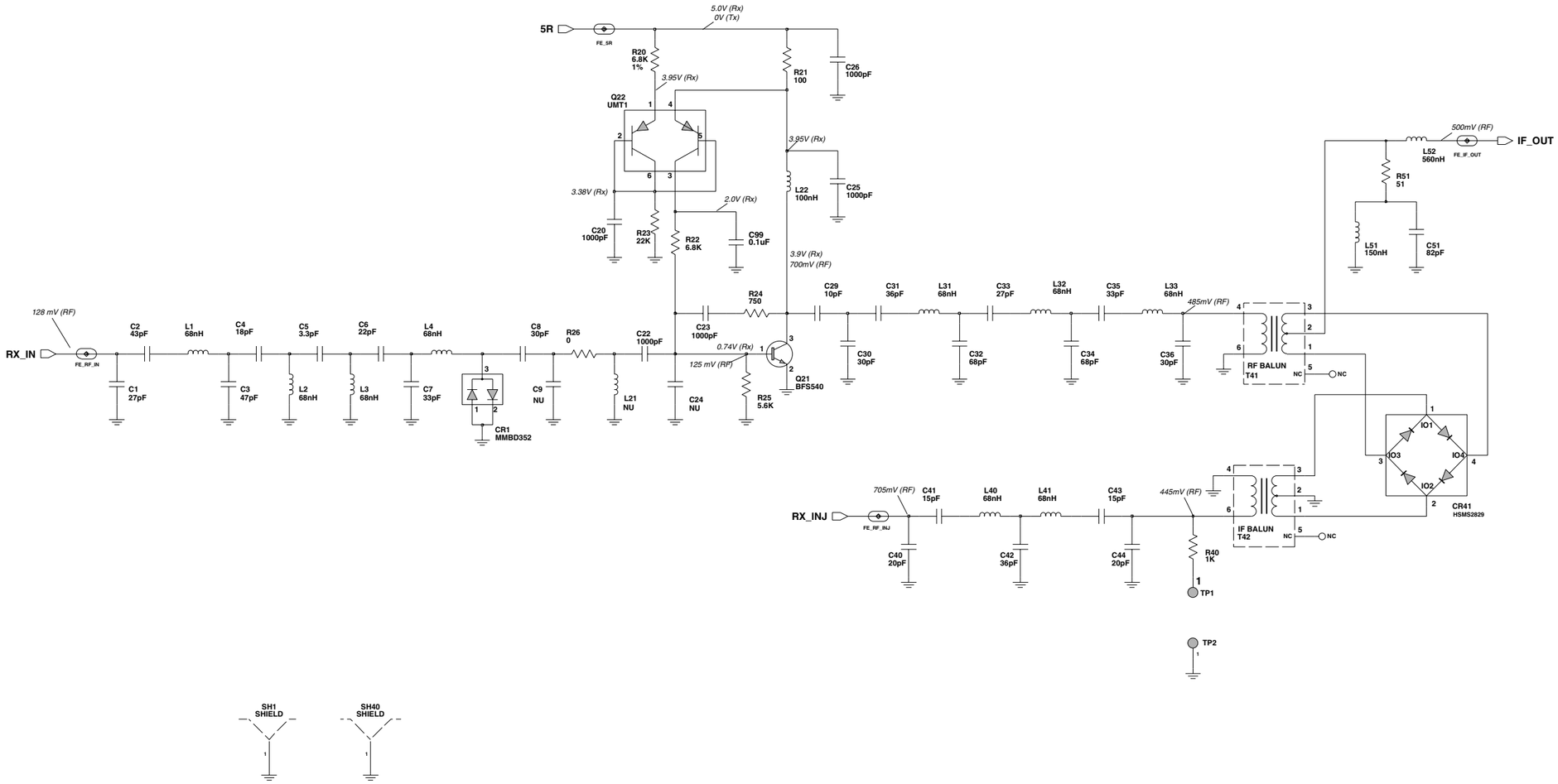


Figure 7-4. VHF (136–162 MHz) Receiver Front End Schematic Diagram (8486769Z02-A)

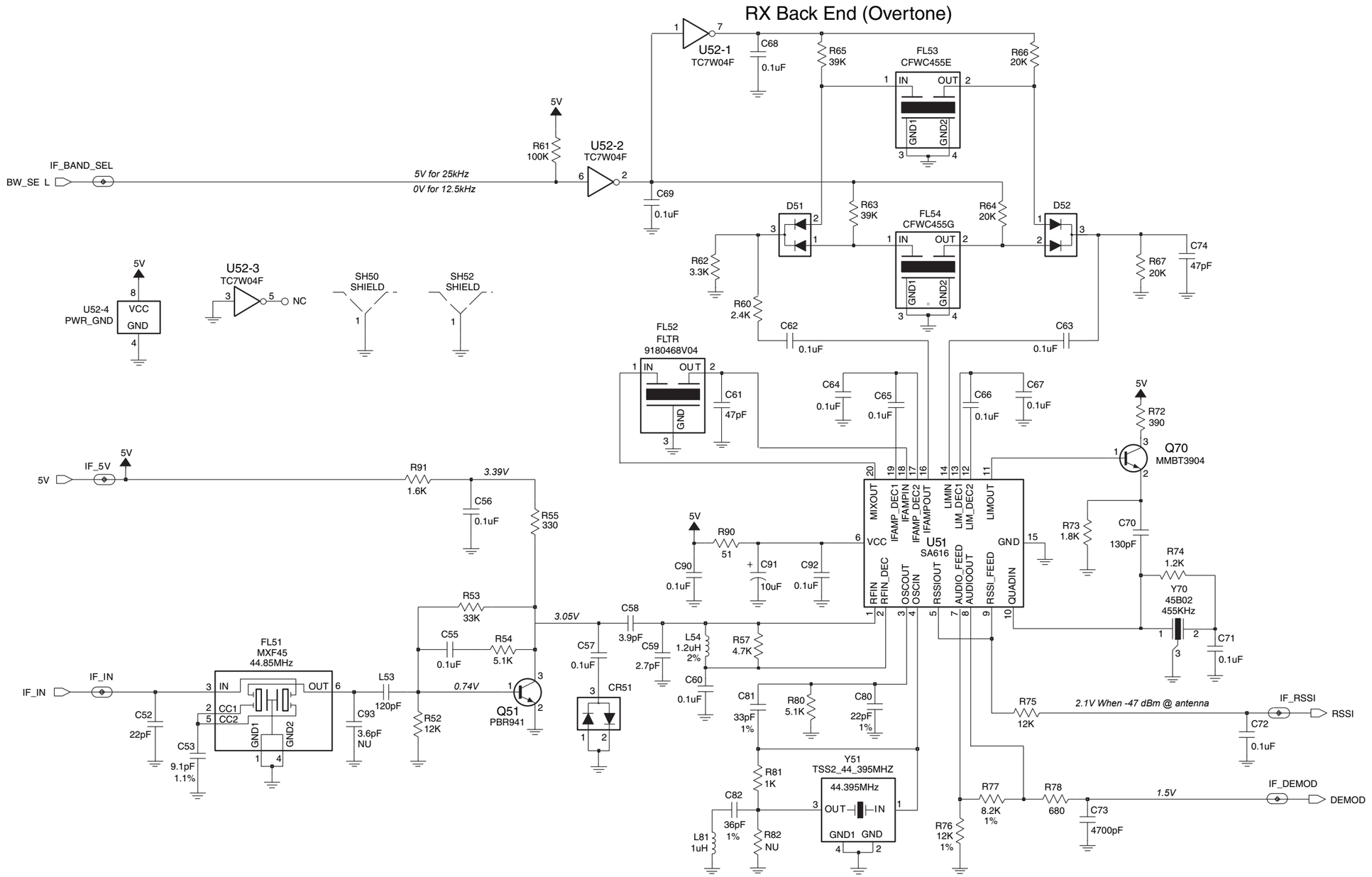
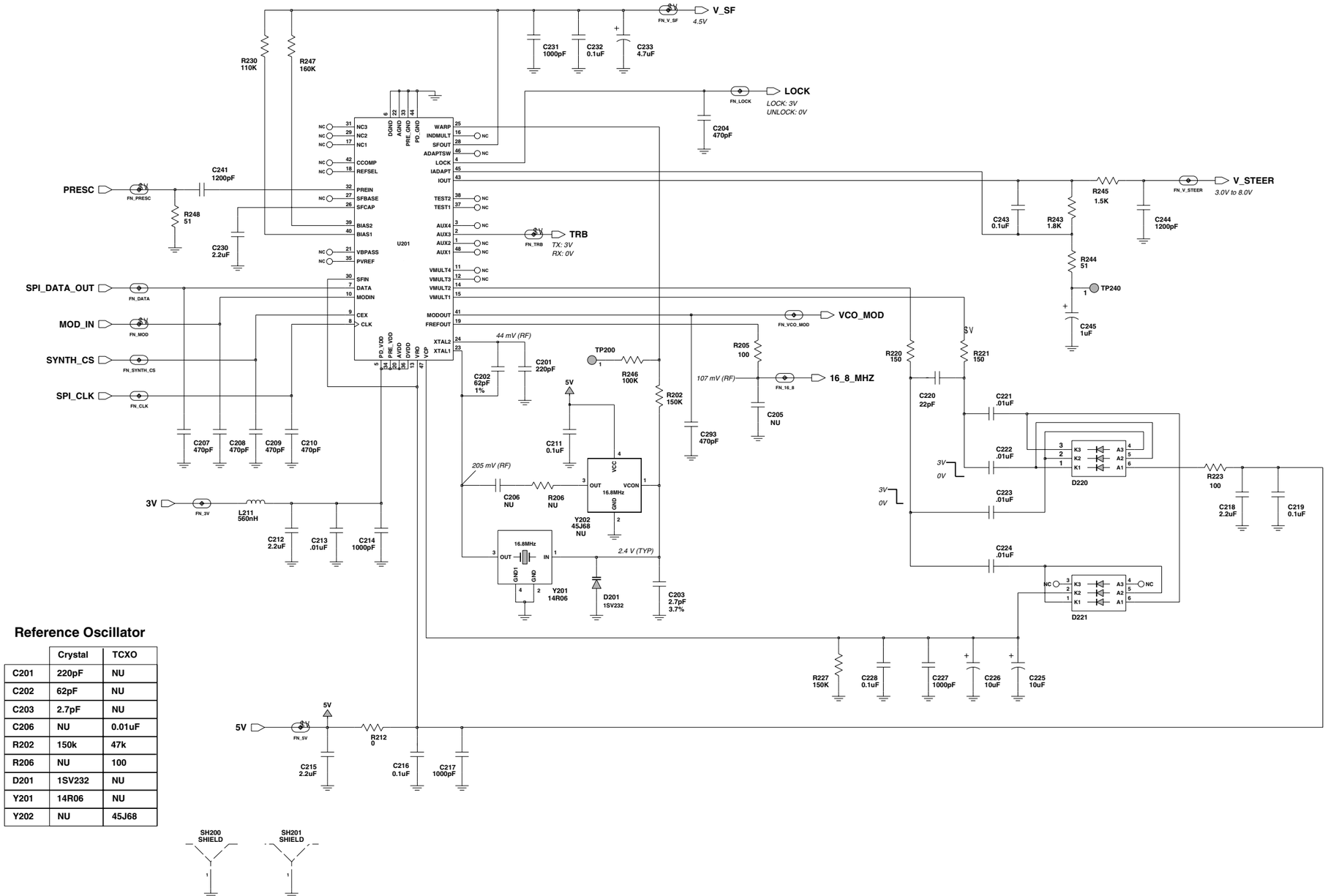


Figure 7-5. VHF (136–162 MHz) Receiver Back End Schematic Diagram (8486769Z02-A)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 7-6. VHF (136–162 MHz) Synthesizer Schematic Diagram (8486769Z02-A)

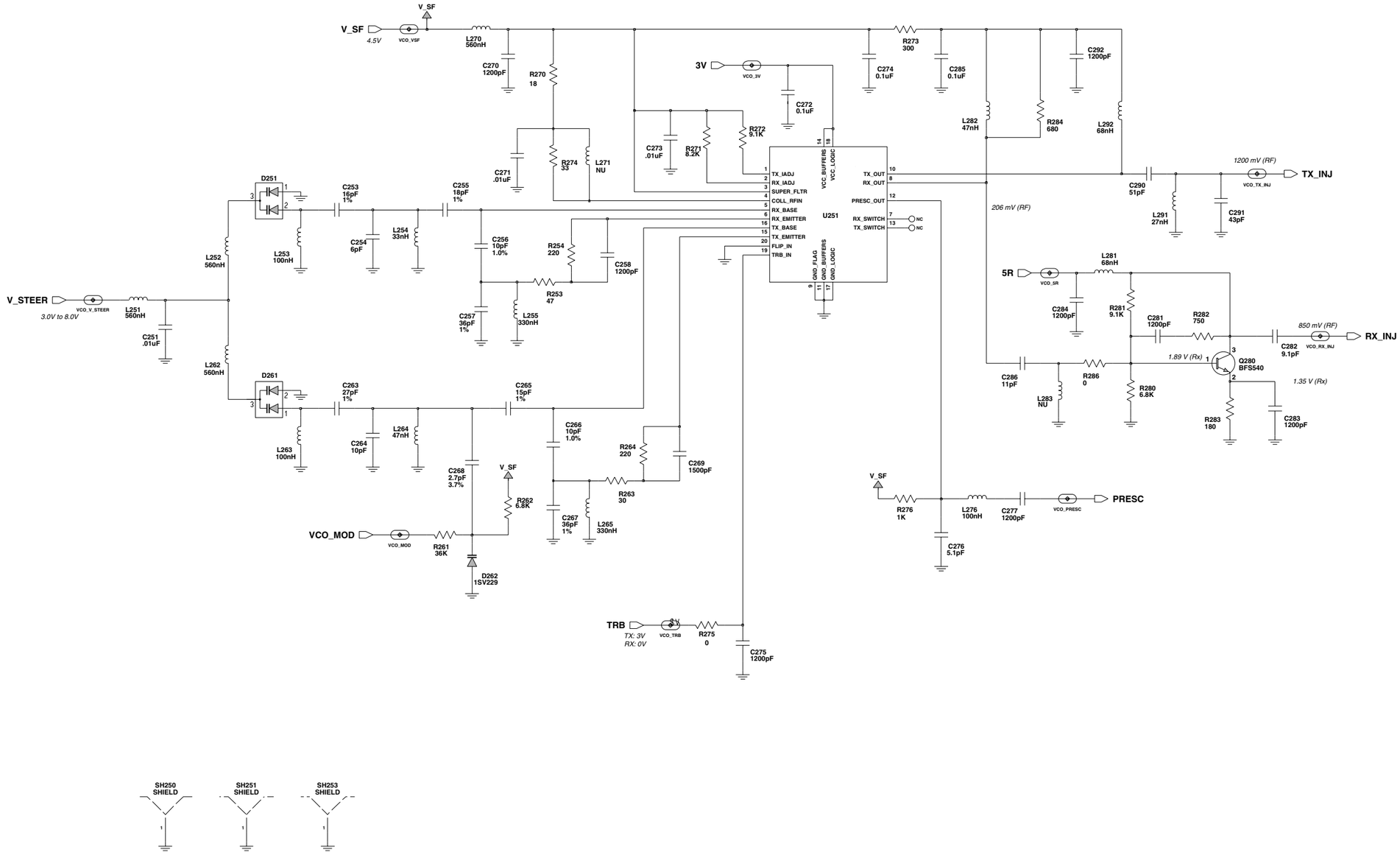


Figure 7-7. VHF (136–162 MHz) Voltage Controlled Oscillator Schematic Diagram (8486769Z02-A)

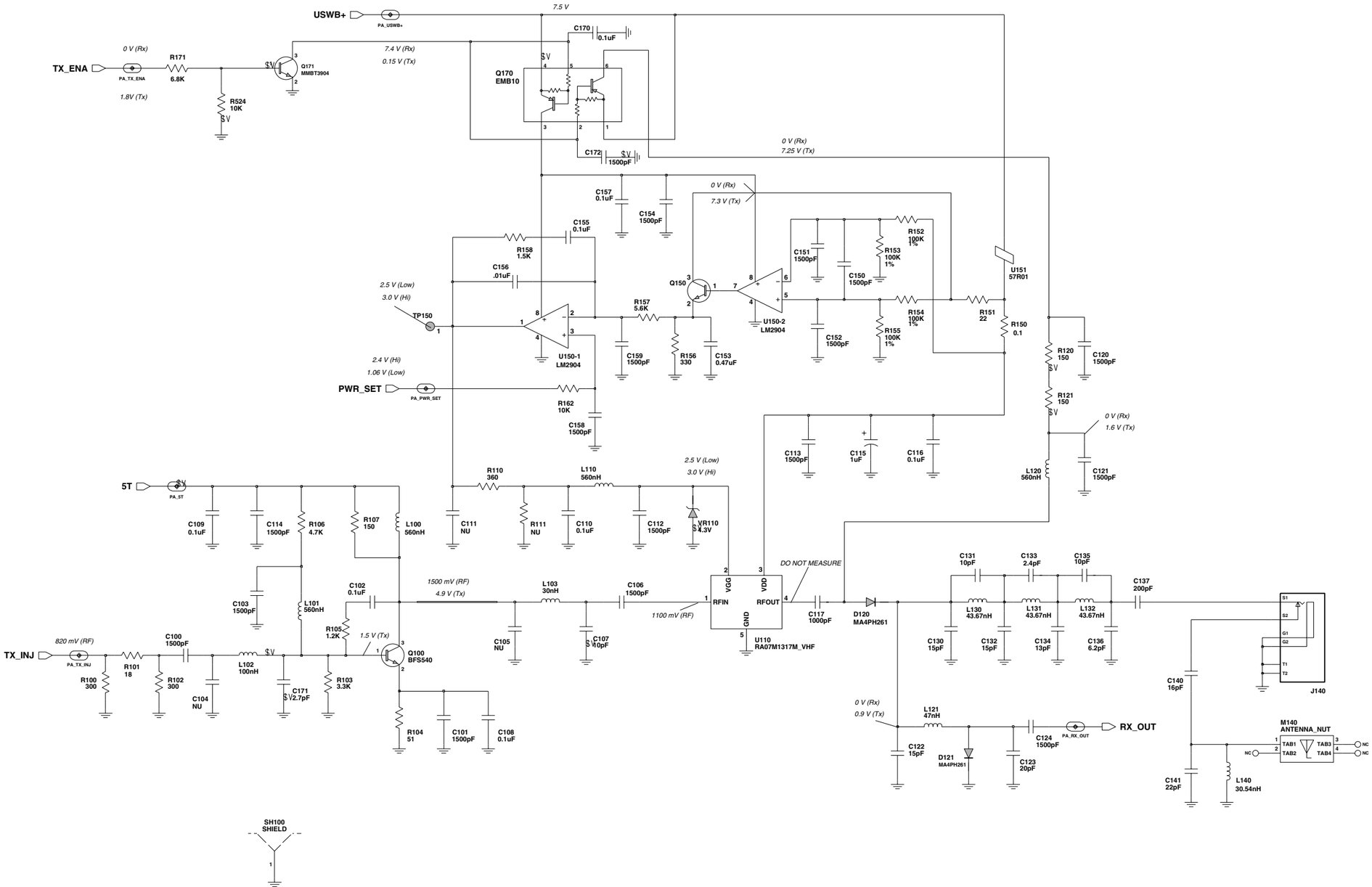


Figure 7-8. VHF (136–162 MHz) Transmitter and Power Control Schematic Diagram (8486769Z02-A)

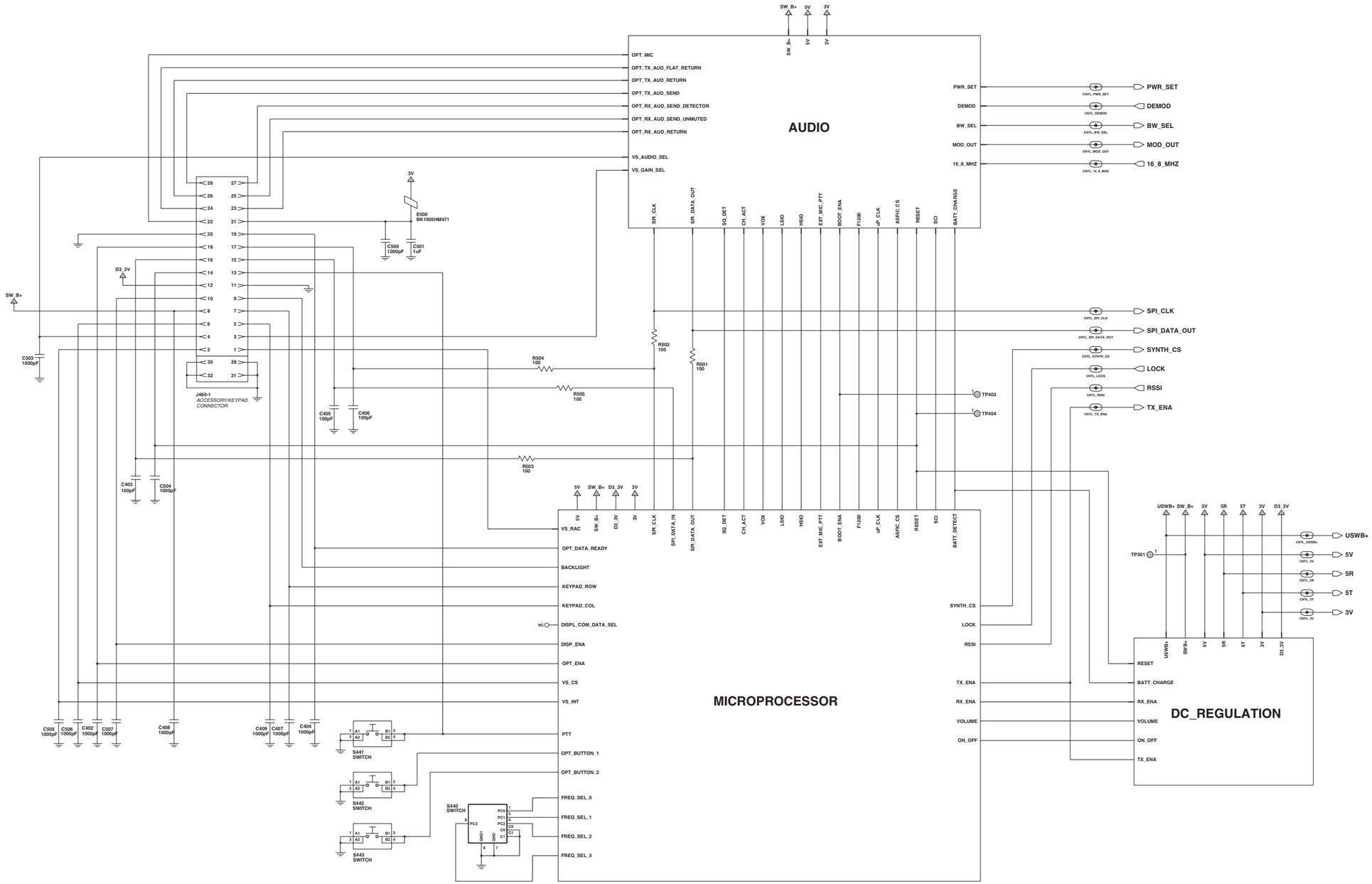


Figure 7-9. VHF (136–162 MHz) Controller Interconnect Schematic Diagram (8486769Z02-A)

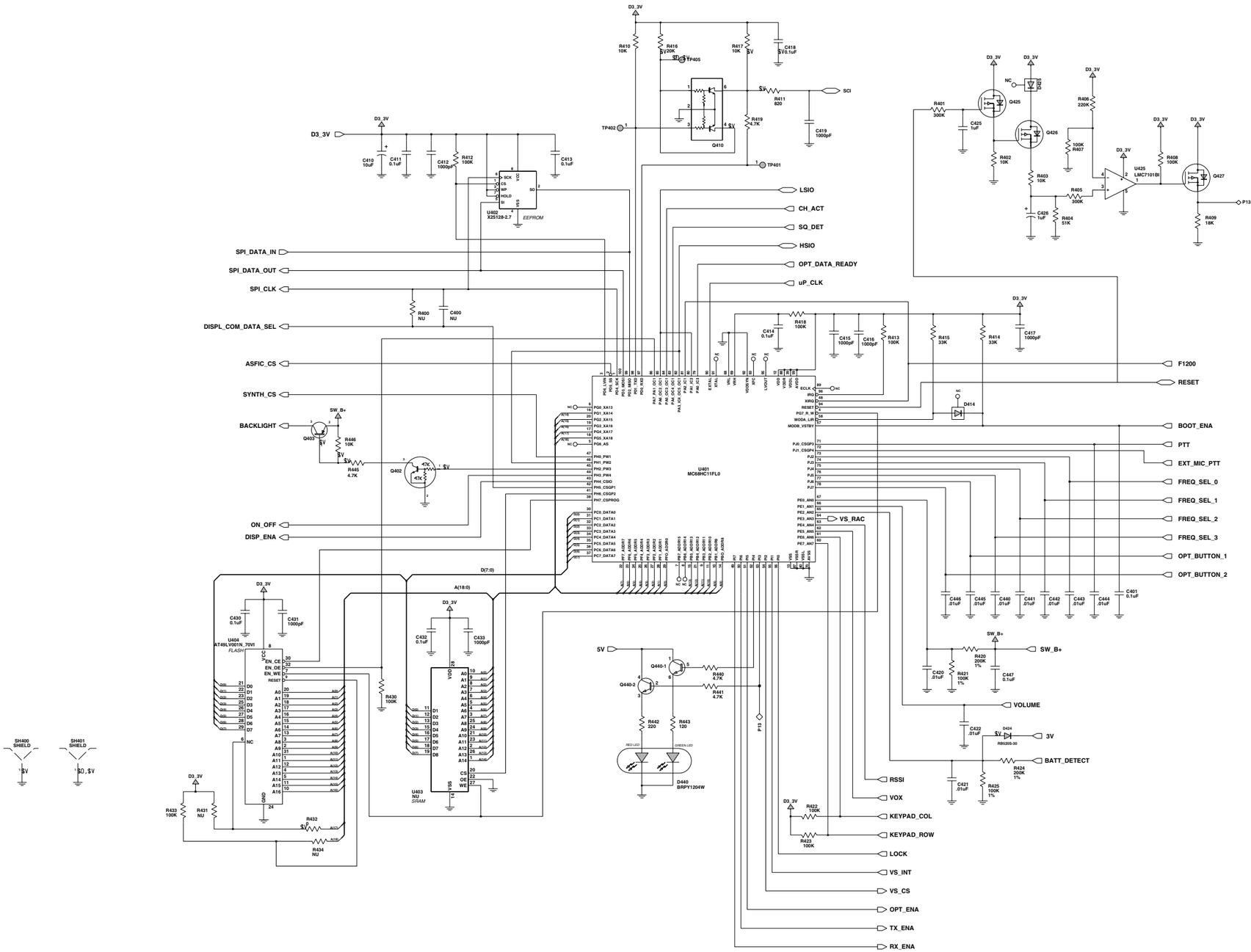
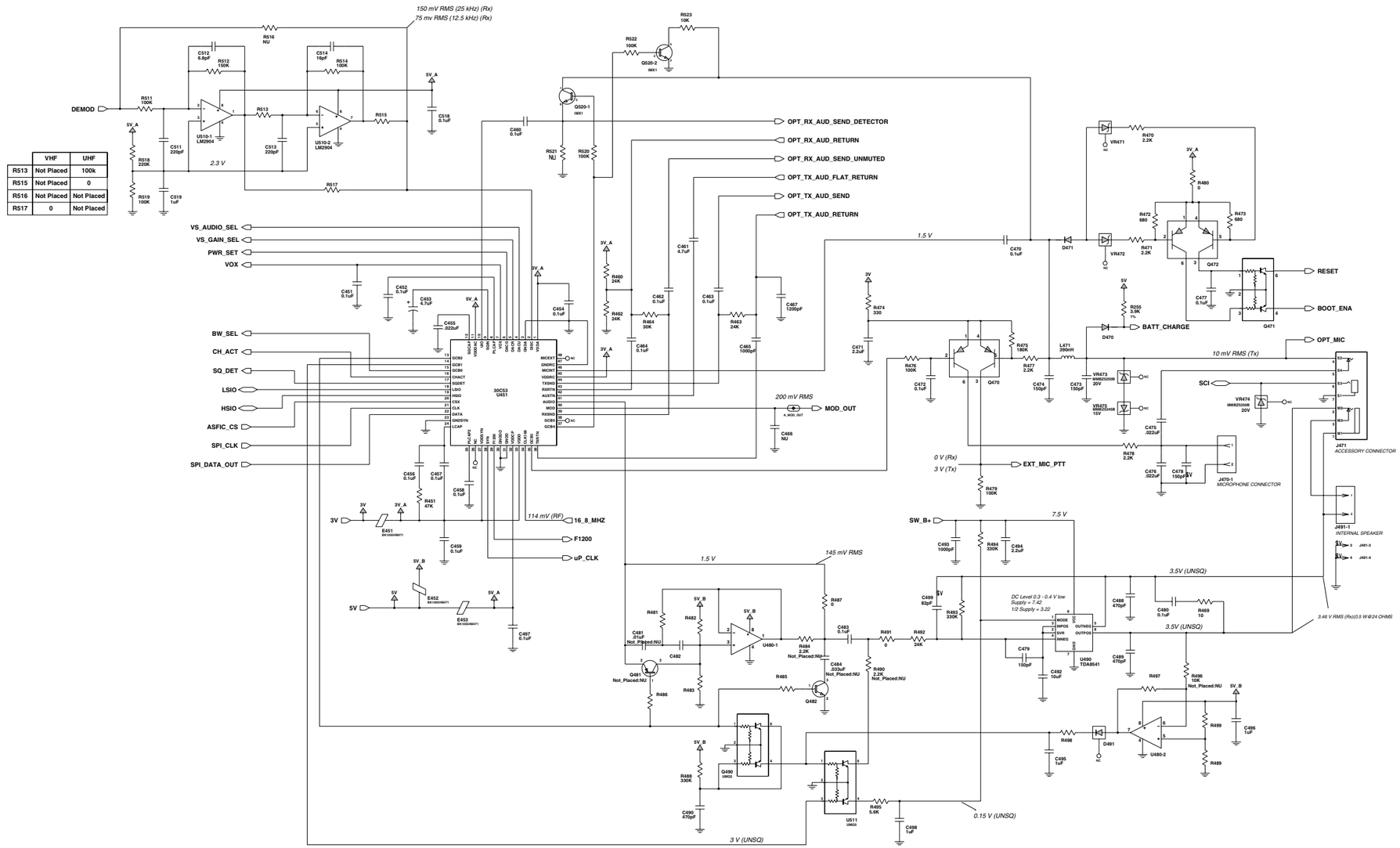


Figure 7-10. VHF (136–162 MHz) Microprocessor Circuitry Schematic Diagram (8486769Z02-A)



	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

Figure 7-11. VHF (136–162 MHz) Audio Circuitry Schematic Diagram (8486769Z02-A)

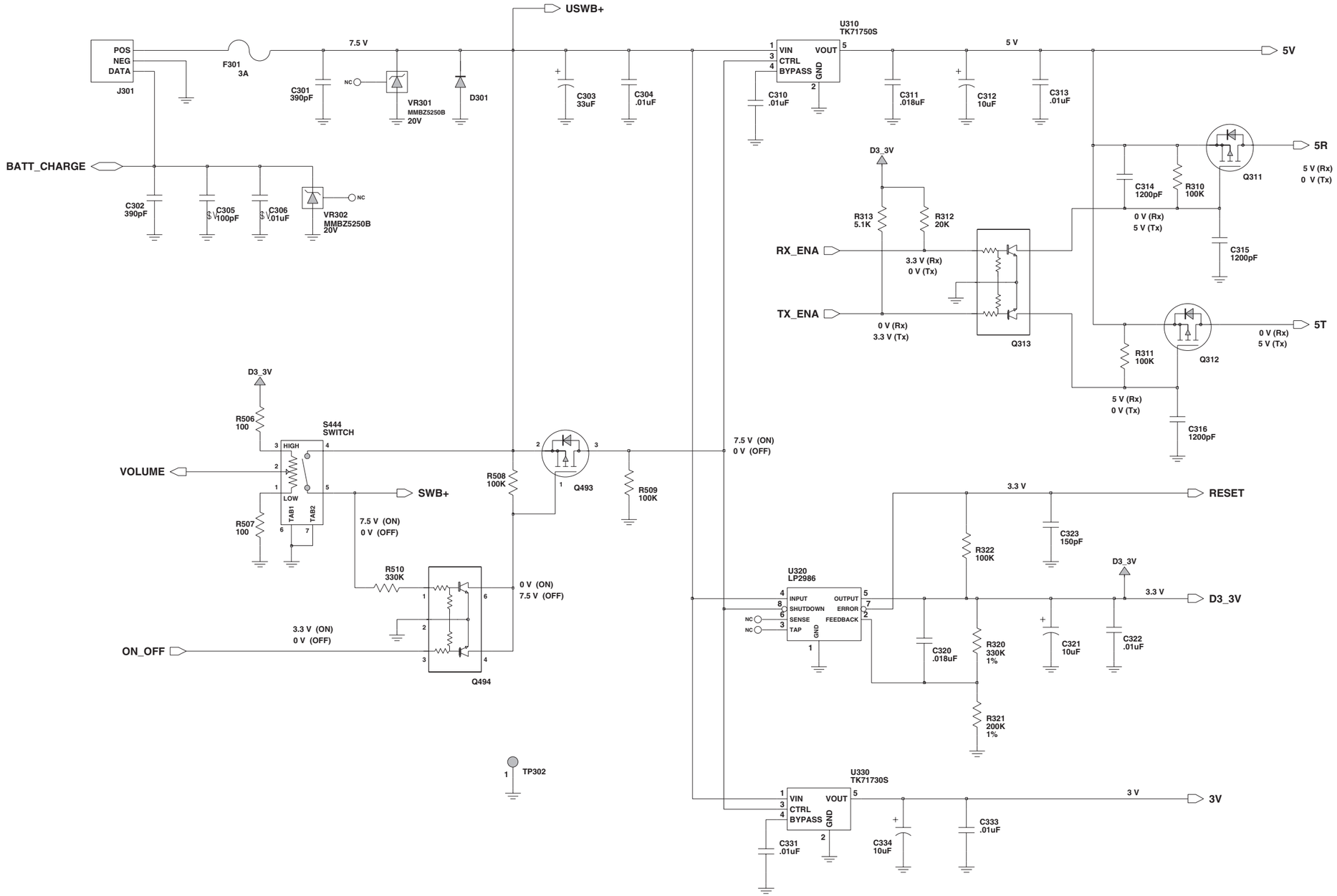
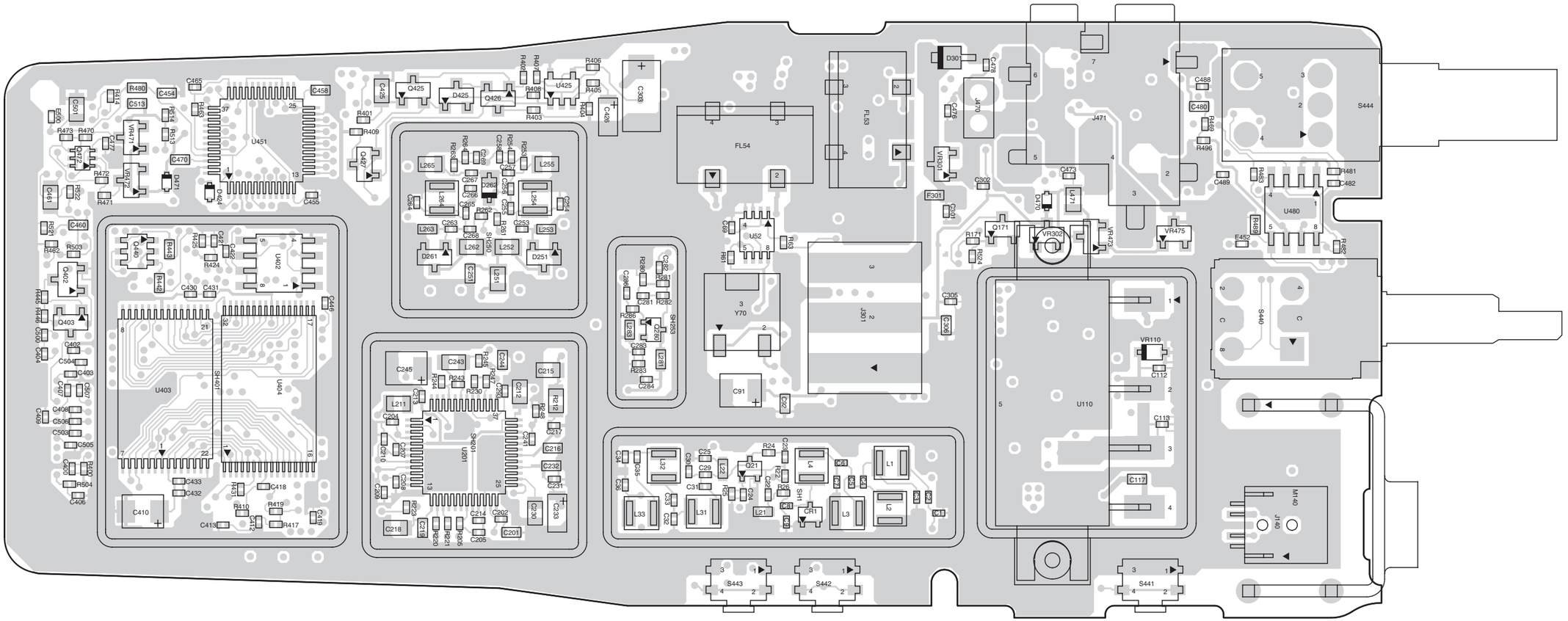


Figure 7-12. VHF (136–162 MHz) DC Regulation Schematic Diagram (8486769Z02-A)


C465
C458
C454
R480
C513
C501
R473
R470
C477
R472
C470
C461
R471
C460
R462
R503
C402
Q403
C405
C504
C403
C407
C408
C506
C503
C505
C400
R404
R504
C406
C410
C433
C432
C430
C431
C446
C418
R410
R419
R417
C419
C422
C425
Q425
D425
Q426
R406
R407
R408
U425
R405
C426
C309
R401
R409
Q427
C265
C267
C266
C263
C264
C262
C261
C268
C269
C253
C254
C255
C252
C251
C250
C249
C248
C247
C246
C245
C244
C243
C242
C241
C240
C239
C238
C237
C236
C235
C234
C233
C232
C231
C230
C229
C228
C227
C226
C225
C224
C223
C222
C221
C220
C219
C218
C217
C216
C215
C214
C213
C212
C211
C210
C209
C208
C207
C206
C205
C204
C203
C202
C201
R262
R263
R264
R265
R266
R267
R268
R269
R270
R271
R272
R273
R274
R275
R276
R277
R278
R279
R280
R281
R282
R283
R284
R285
R286
R287
R288
R289
R290
R291
R292
R293
R294
R295
R296
R297
R298
R299
R2100
R2101

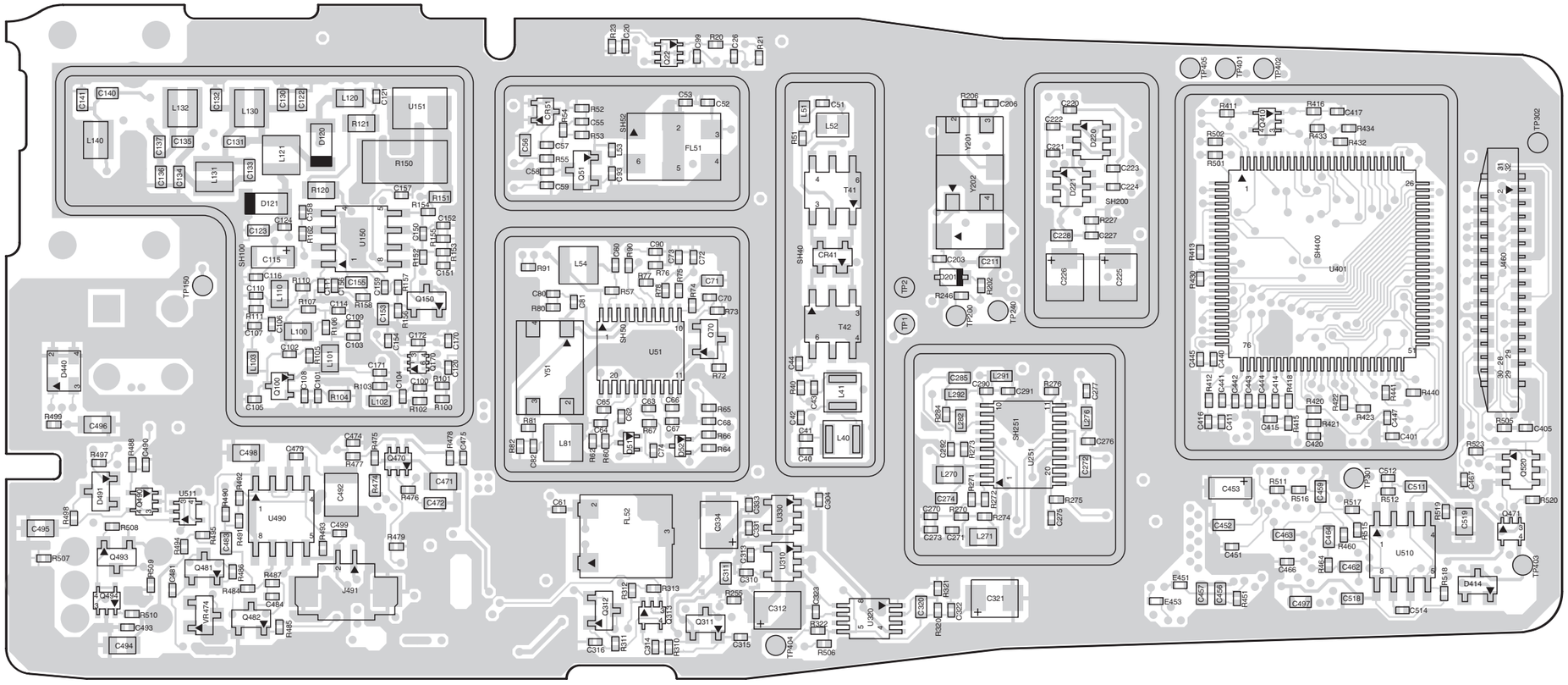


Figure 7-14. VHF (136–162 MHz) Board Bottom Side View (8486769Z02-A)

VHF (136–162 MHz) Radio Parts List (8486769Z02-A)

Circuit Ref	Motorola Part No.	Description
C1	2109445U43	CAP, 27pF
C2	2109445U48	CAP, 43pF
C3	2109445U49	CAP, 47pF
C4	2109445U39	CAP, 18pF
C5	2109445U15	CAP, 3.3pF
C6	2109445U41	CAP, 22pF
C7	2109445U45	CAP, 33pF
C8	2109445U44	CAP, 30pF
C9	NOT PLACED	CAP, 24pF
C20	2113743L17	CAP, 1000pF
C22	2113743L17	CAP, 1000pF
C23	2113743L17	CAP, 1000pF
C24	NOT PLACED	CAP, 6.2pF
C25	2113743L17	CAP, 1000pF
C26	2113743L17	CAP, 1000pF
C29	2109445U27	CAP, 10pF
C30	2109445U44	CAP, 30pF
C31	2109445U46	CAP, 36pF
C32	2109445U53	CAP, 68pF
C33	2109445U43	CAP, 27pF
C34	2109445U53	CAP, 68pF
C35	2109445U45	CAP, 33pF
C36	2109445U44	CAP, 30pF
C40	2109445U40	CAP, 20pF
C41	2109445U37	CAP, 15pF
C42	2109445U46	CAP, 36pF
C43	2109445U37	CAP, 15pF
C44	2109445U40	CAP, 20pF
C51	2113743N48	CAP, 82pF
C52	2109445U41	CAP, 22pF
C53	2109445U26	CAP, 9.1pF
C55	2113743M24	CAP, 0.1uF
C56	2113743E20	CAP, 0.1uF
C57	2113743M24	CAP, 0.1uF
C58	2113743N16	CAP, 3.9pF
C59	2113743N12	CAP, 2.7pF
C60	2113743M24	CAP, 0.1uF
C61	2113743N46	CAP, 68pF
C62	2113743M24	CAP, 0.1uF
C63	2113743M24	CAP, 0.1uF
C64	2113743M24	CAP, 0.1uF
C65	2113743M24	CAP, 0.1uF
C66	2113743M24	CAP, 0.1uF
C67	2113743M24	CAP, 0.1uF
C68	2113743M24	CAP, 0.1uF
C69	2113743M24	CAP, 0.1uF
C70	2113743N53	CAP, 130pF
C71	2113743E20	CAP, 0.1uF
C72	2113743M24	CAP, 0.1uF
C73	2113743L33	CAP, 4700pF
C74	2113743N42	CAP, 47pF
C80	2109445U41	CAP, 22pF
C81	2109445U45	CAP, 33pF
C82	2109445U46	CAP, 36pF
C90	2113743M24	CAP, 0.1uF
C91	2311049A57	CAP, 10uF
C92	2113743E20	CAP, 0.1uF
C93	NOT PLACED	CAP, 3.6pF
C99	2113743M24	CAP, 0.1uF
C100	2113743L21	CAP, 1500pF
C101	2113743L21	CAP, 1500pF
C102	2113743M24	CAP, 0.1uF
C103	2113743L21	CAP, 1500pF
C104	NOT PLACED	CAP, 27pF
C105	NOT PLACED	CAP, 10pF
C106	2113743L21	CAP, 1500pF
C107	2113743N26	CAP, 10pF
C108	2113743M24	CAP, 0.1uF
C109	2113743M24	CAP, 0.1uF
C110	2113743M24	CAP, 0.1uF
C111	NOT PLACED	CAP, 1500pF
C112	2113743L21	CAP, 1500pF
C113	2113743L21	CAP, 1500pF
C114	2113743L21	CAP, 1500pF
C115	2311049A07	CAP, 1uF
C116	2113743M24	CAP, 0.1uF
C117	2113741F25	CAP, 1000pF
C120	2113743L21	CAP, 1500pF
C121	2113743L21	CAP, 1500pF
C122	2113740F31	CAP, 15pF
C123	2113740F34	CAP, 20pF
C124	2113743L21	CAP, 1500pF
C130	2113740F31	CAP, 15pF
C131	2113740F27	CAP, 10pF
C132	2113740F31	CAP, 15pF
C133	2113740F12	CAP, 2.4pF
C134	2113740F30	CAP, 13pF
C135	2113740F27	CAP, 10pF
C136	2113740F22	CAP, 6.2pF
C137	2113740F58	CAP, 200pF
C140	2113740F32	CAP, 16pF
C141	2113740F35	CAP, 22pF
C150	2113743L21	CAP, 1500pF
C151	2113743L21	CAP, 1500pF
C152	2113743L21	CAP, 1500pF
C153	2113743K18	CAP, 0.47uF
C154	2113743L21	CAP, 1500pF
C155	2113743E20	CAP, 0.1uF
C156	2113743L41	CAP, .01uF
C157	2113743M24	CAP, 0.1uF
C158	2113743L21	CAP, 1500pF
C159	2113743L21	CAP, 1500pF
C170	2113743M24	CAP, 0.1uF
C171	2113743N12	CAP, 2.7pF
C172	2113743L21	CAP, 1500pF
C201	2113740F59	CAP, 220pF
C202	2109445U52	CAP, 62pF
C203	2109445U13	CAP, 2.7pF
C204	2113743L09	CAP, 470pF
C205	NOT PLACED	CAP, 2.7pF
C206	NOT PLACED	CAP, 1000pF
C207	2113743L09	CAP, 470pF
C208	2113743L09	CAP, 470pF
C209	2113743L09	CAP, 470pF
C210	2113743L09	CAP, 470pF
C211	2113743E20	CAP, 0.1uF
C212	2113743F18	CAP, 2.2uF
C213	2113743L41	CAP, .01uF
C214	2113743L17	CAP, 1000pF
C215	2113743F18	CAP, 2.2uF
C216	2113743E20	CAP, 0.1uF
C217	2113743L17	CAP, 1000pF
C218	2113743F18	CAP, 2.2uF
C219	2113743E20	CAP, 0.1uF
C220	2113743N34	CAP, 22pF
C221	2113743L41	CAP, .01uF
C222	2113743L41	CAP, .01uF
C223	2113743L41	CAP, .01uF
C224	2113743L41	CAP, .01uF
C225	2311049A57	CAP, 10uF
C226	2311049A57	CAP, 10uF
C227	2113743L17	CAP, 1000pF
C228	2113743E20	CAP, 0.1uF
C230	2113743F18	CAP, 2.2uF
C231	2113743L17	CAP, 1000pF
C232	2113743E20	CAP, 0.1uF
C233	2311049A56	CAP, 4.7uF
C241	2113743L19	CAP, 1200pF
C243	2113741M69	CAP, 0.1uF
C244	2113741F27	CAP, 1200pF
C245	2311049A08	CAP, 1uF
C251	2113741F49	CAP, .01uF
C253	2109445U38	CAP, 16pF
C254	2109445U30	CAP, 6pF
C255	2109445U39	CAP, 18pF
C256	2109445U27	CAP, 10pF
C257	2109445U46	CAP, 36pF
C258	2113743L19	CAP, 1200pF
C263	2109445U43	CAP, 27pF
C264	2109445U27	CAP, 10pF
C265	2109445U37	CAP, 15pF
C266	2109445U27	CAP, 10pF
C267	2109445U46	CAP, 36pF
C268	2109445U13	CAP, 2.7pF
C269	2113743L21	CAP, 1500pF
C270	2113743L19	CAP, 1200pF
C271	2113743L41	CAP, .01uF
C272	2113743E20	CAP, 0.1uF
C273	2113743L41	CAP, .01uF
C274	2113743E20	CAP, 0.1uF
C275	2113743L19	CAP, 1200pF
C276	2113743N19	CAP, 5.1pF
C277	2113743L19	CAP, 1200pF
C281	2113743L19	CAP, 1200pF
C282	2113743N25	CAP, 9.1pF
C283	2113743L19	CAP, 1200pF
C284	2113743L19	CAP, 1200pF
C285	2113743E20	CAP, 0.1uF
C286	2113743N27	CAP, 11pF
C290	2113743N43	CAP, 51pF
C291	2109445U48	CAP, 43pF
C292	2113743L19	CAP, 1200pF
C293	2113743L09	CAP, 470pF
C301	2113743L07	CAP, 390pF
C302	2113743L07	CAP, 390pF
C303	2311049A97	CAP, 33uF
C304	2113743L41	CAP, .01uF
C305	2113743N50	CAP, 100pF
C306	2113741F49	CAP, .01uF
C310	2113743L41	CAP, .01uF
C311	2113743E05	CAP, .018uF
C312	2311049A57	CAP, 10uF
C313	2113743L41	CAP, .01uF
C314	2113743L19	CAP, 1200pF
C315	2113743L19	CAP, 1200pF
C316	2113743L19	CAP, 1200pF
C320	2113743E05	CAP, .018uF
C321	2311049A57	CAP, 10uF
C322	2113743L41	CAP, .01uF
C323	2113743N54	CAP, 150pF
C331	2113743L41	CAP, .01uF
C333	2113743L41	CAP, .01uF
C334	2311049A57	CAP, 10uF
C400	NOT PLACED	CAP, .022uF
C401	2113743M24	CAP, 0.1uF
C402	2113743L17	CAP, 1000pF
C403	2113743N50	CAP, 100pF
C404	2113743L17	CAP, 1000pF
C405	2113743N50	CAP, 100pF
C406	2113743N50	CAP, 100pF
C407	2113743L17	CAP, 1000pF
C408	2113743L17	CAP, 1000pF
C409	2113743L17	CAP, 1000pF

Circuit Ref	Motorola Part No.	Description
C410	2311049A57	CAP, 10uF
C411	2113743M24	CAP, 0.1uF
C412	2113743L17	CAP, 1000pF
C413	2113743M24	CAP, 0.1uF
C414	2113743M24	CAP, 0.1uF
C415	2113743L17	CAP, 1000pF
C416	2113743L17	CAP, 1000pF
C417	2113743L17	CAP, 1000pF
C418	2113743M24	CAP, 0.1uF
C419	2113743L17	CAP, 1000pF
C420	2113743L41	CAP, .01uF
C421	2113743L41	CAP, .01uF
C422	2113743L41	CAP, .01uF
C425	2113743F16	CAP, 1.0uF
C426	2311049A07	CAP, 1.0uF
C430	2113743M24	CAP, 0.1uF
C431	2113743L17	CAP, 1000pF
C432	2113743M24	CAP, 0.1uF
C433	2113743L17	CAP, 1000pF
C440	2113743L41	CAP, .01uF
C441	2113743L41	CAP, .01uF
C442	2113743L41	CAP, .01uF
C443	2113743L41	CAP, .01uF
C444	2113743L41	CAP, .01uF
C445	2113743L41	CAP, .01uF
C446	2113743L41	CAP, .01uF
C447	2113743M24	CAP, 0.1uF
C451	2113743M24	CAP, 0.1uF
C452	2113743E20	CAP, 0.1uF
C453	2311049A56	CAP, 4.7uF
C454	2113743E20	CAP, 0.1uF
C455	2113743L48	CAP, .022uF
C456	2113743E20	CAP, 0.1uF
C457	2113743E20	CAP, 0.1uF
C458	2113743E20	CAP, 0.1uF
C459	2113743E20	CAP, 0.1uF
C460	2113743E20	CAP, 0.1uF
C461	2113928C04	CAP, 4.7uF
C462	2113743E20	CAP, 0.1uF
C463	2113743E20	CAP, 0.1uF
C464	2113743E20	CAP, 0.1uF
C465	2113743L17	CAP, 1000pF
C466	NOT PLACED	CAP, 470pF
C467	2113743L19	CAP, 1200pF
C470	2113743E20	CAP, 0.1uF
C471	2113743F18	CAP, 2.2uF
C472	2113743E20	CAP, 0.1uF
C473	2113743N54	CAP, 150pF
C474	2113743N54	CAP, 150pF
C475	2113743L48	CAP, .022uF
C476	2113743L48	CAP, .022uF
C477	2113743M24	CAP, 0.1uF
C478	2113743N54	CAP, 150pF
C479	2113743N54	CAP, 150pF
C480	2113743E20	CAP, 0.1uF
C481	NOT PLACED	CAP, .01uF
C482	NOT PLACED	CAP, .01uF
C483	2113928H02	CAP, 0.22uF
C484	NOT PLACED	CAP, .033uF
C488	2113743L09	CAP, 470pF
C489	2113743L09	CAP, 470pF
C490	2113743L09	CAP, 470pF
C492	2113928J08	CAP, 10uF
C493	2113743L17	CAP, 1000pF
C494	2113743F18	CAP, 2.2uF
C495	2113743F16	CAP, 1uF
C496	2113743F16	CAP, 1uF
C497	2113743E20	CAP, 0.1uF
C498	2113743F16	CAP, 1uF
C499	2113743N40	CAP, 39pF
C500	2113743L17	CAP, 1000pF
C501	2113743F16	CAP, 1uF
C503	2113743L17	CAP, 1000pF
C504	2113743L17	CAP, 1000pF
C505	2113743L17	CAP, 1000pF
C506	2113743L17	CAP, 1000pF
C507	2113743L17	CAP, 1000pF
C511	2113740F59	CAP, 220pF
C512	2113743N22	CAP, 6.8pF
C513	2113740F59	CAP, 220pF
C514	2113743N31	CAP, 16pF
C518	2113743E20	CAP, 0.1uF
C519	2113743F16	CAP, 1uF
CR1	4813825A19	dual Schottky, MMBD352
CR41	4802246J04	quad ring diode, HSMS2829
CR51	4813825A19	dual Schottky, MMBD352
D51	4802245J97	dual silicon DAN235ETL
D52	4802245J97	dual silicon DAN235ETL
D120	4880973Z02	silicon PIN, MA4PH261
D121	4880973Z02	silicon PIN, MA4PH261
D201	4862824C03	varactor, 1SV232
D220	4802233J09	triple diode, IMN10
D221	4802233J09	triple diode, IMN10
D251	4805649Q13	dual varactor, 1SV228
D261	4805649Q13	dual varactor, 1SV228
D262	4862824C01	varactor, 1SV229
D301	4813833A19	silicon, reverse polarity, MBRM120ET3
D414	4805129M41	Schottky, MMBD501
D424	4809924D18	Schottky, RB520S-30
D425	4805129M41	SOT SMBD1022 RH29M19 LH
D440	4805729G49	dual LED red/green, BRPY1204W
D470	4809924D18	Schottky, RB520S-30
D471	4809924D18	Schottky, RB520S-30
D491	NOT PLACED	Schottky, MMBD501
E451	2480640Z01	bead, BK1005HM471
E452	2480640Z01	bead, BK1005HM471
E453	2480640Z01	bead, BK1005HM471
E500	2480640Z01	bead, BK1005HM471
F301	6580542Z01	fuse, 3 amp
FL51	9186801Z01	OSC,XTAL,,44.85MHZ
FL52	9180468V04	4-pole ceramic filter, 455 kHz, CFU455F
FL53	9180469V05	6-pole ceramic, filter, 455 kHz, CFWC455E
FL54	9180469V03	6-pole ceramic filter, 455 kHz, CFWC455G
J140	0986428Z01	connector, external antenna
J301	0986565Z01	battery contact assembly
J460	NOT PLACED	CONN,ZIF,28 CONT TIN CBL
J470	0985818A01	connector, 2-pin internal mic
J471	0980683Z03	connector, 2.5 / 3.5mm, accessories
J491	2809926G01	connector, 2-pin internal speaker
L1	2413923C09	IDCTR, 68nH
L2	2413923C09	IDCTR, 68nH
L3	2413923C09	IDCTR, 68nH
L4	2413923C09	IDCTR, 68nH
L21	NOT PLACED	IDCTR, 39nH
L22	2413926N24	IDCTR, 100nH
L31	2413923C09	IDCTR, 68nH
L32	2413923C09	IDCTR, 68nH
L33	2413923C09	IDCTR, 68nH
L40	2413923C09	IDCTR, 68nH
L41	2413923C09	IDCTR, 68nH
L51	2413926N26	IDCTR, 150nH
L52	2462587V43	IDCTR, 560nH
L53	2113743N52	CAP, 120pF
L54	2413923A25	IDCTR, 1.2uH
L81	2413923A19	IDCTR, 1uH
L100	2413926K32	IDCTR, 560nH
L101	2413926K32	IDCTR, 560nH
L102	2409377M17	IDCTR, 100nH
L103	2409377M31	IDCTR, 30nH
L110	2413926K32	IDCTR, 560nH
L120	2413926K32	IDCTR, 560nH
L121	2462587N49	IDCTR, 47nH
L130	2479990N01	IDCTR, 43.67nH
L131	2479990N01	IDCTR, 43.67nH
L132	2479990N01	IDCTR, 43.67nH
L140	2479990M01	IDCTR, 30.54nH
L211	2413926K32	IDCTR, 560nH
L251	2413926K32	IDCTR, 560nH
L252	2413926K32	IDCTR, 560nH
L253	2409377M17	IDCTR, 100nH
L254	2413923C05	IDCTR, 33nH
L255	2413926K29	IDCTR, 330nH
L262	2413926K32	IDCTR, 560nH
L263	2409377M17	IDCTR, 100nH
L264	2413923C07	IDCTR, 47nH
L265	2413926K29	IDCTR, 330nH
L270	2413926K32	IDCTR, 560nH
L271	NOT PLACED	IDCTR, 560nH
L276	2413926N24	IDCTR, 100nH
L281	2413926N22	IDCTR, 68nH
L282	2413926N20	IDCTR, 47nH
L283	NOT PLACED	IDCTR, 270nH
L291	2413926N17	IDCTR, 27nH
L292	2413926N22	IDCTR, 68nH
L471	2413926K30	IDCTR, 390nH
M140	0286427Z01	antenna nut
Q21	4802245J95	silicon NPN, BFS540
Q22	4805723X02	dFcual silicon PNP, UMT1
Q51	4802197J95	silicon NPN, PBR941
Q70	4880214G02	silicon NPN, MMBT3904
Q100	4802245J95	silicon NPN, BFS540
Q150	4880214G02	silicon NPN, MMBT3904
Q170	4809939C34	dual silicon PNP, EMB10
Q171	4880214G02	silicon NPN, MMBT3904
Q280	4802245J95	silicon NPN, BFS540
Q311	4809579E18	P-channel MOSFET, TP0101T
Q312	4809579E18	P-channel MOSFET, TP0101T
Q313	4802245J54	dual digit NPN, UMG5
Q402	4880048M01	digital NPN, DTC144EKA
Q403	4813824A17	silicon PNP, MMBT3906
Q410	4802245J54	dual digit NPN, UMG5
Q425	4809579E18	TSTR MOSFET P-CHAN TP010IT
Q426	4809579E18	TSTR MOSFET P-CHAN TP010IT
Q427	4809579E18	TSTR MOSFET P-CHAN TP010IT
Q440	5180159R01	dual NPN, IMX1
Q470	4805723X02	dual silicon PNP, UMT1
Q471	4802245J54	dual digital NPN, UMG5
Q472	4805723X02	dual silicon PNP, UMT1
Q481	NOT PLACED	MMBT3906
Q482	NOT PLACED	MMBT3904
Q490	4802245J54	dual digital NPN, UMG5
Q493	4809579E18	P-channel MOSFET, TP0101T
Q494	4802245J54	dual digital NPN, UMG5

Circuit Ref	Motorola Part No.	Description
Q520	5180159R01	dual NPN, IMX1
R20	0662057U97	RES, 6.8K
R21	0662057M50	RES, 100
R22	0662057M94	RES, 6.8K
R23	0662057V11	RES, 22K
R24	0662057M71	RES, 750
R25	0662057M92	RES, 5.6K
R26	0662057M01	RES, 0
R40	0662057M74	RES, 1K
R51	0662057M43	RES, 51
R52	0662057N01	RES, 12K
R53	0662057N11	RES, 33K
R54	0662057M91	RES, 5.1K
R55	0662057M62	RES, 330
R57	0662057M90	RES, 4.7K
R60	0662057M83	RES, 2.4K
R61	0662057N23	RES, 100K
R62	0662057M86	RES, 3.3K
R63	0662057N13	RES, 39K
R64	0662057N06	RES, 20K
R65	0662057N13	RES, 39K
R66	0662057N06	RES, 20K
R67	0662057N06	RES, 20K
R72	0662057M64	RES, 390
R73	0662057M80	RES, 1.8K
R74	0662057M76	RES, 1.2K
R75	0662057N01	RES, 12K
R76	0662057V04	RES, 12K
R77	0662057U99	RES, 8.2K
R78	0662057M70	RES, 680
R80	0662057M91	RES, 5.1K
R81	0662057M74	RES, 1K
R82	NOT PLACED	RES, 0
R90	0662057M43	RES, 51
R91	0662057M79	RES, 1.6K
R100	0662057M61	RES, 300
R101	0662057M32	RES, 18
R102	0662057M61	RES, 300
R103	0662057M86	RES, 3.3K
R104	0662057A18	RES, 51
R105	0662057M76	RES, 1.2K
R106	0662057M90	RES, 4.7K
R107	0662057M54	RES, 150
R110	0662057M63	RES, 360
R111	NOT PLACED	RES, 2.7K
R120	0662057C55	RES, 150
R121	0662057C55	RES, 150
R150	0680539Z01	RES, 0.1
R151	0662057A09	RES, 22
R152	0662057V27	RES, 100K
R153	0662057V27	RES, 100K
R154	0662057V27	RES, 100K
R155	0662057V27	RES, 100K
R156	0662057M62	RES, 330
R157	0662057M92	RES, 5.6K
R158	0662057M78	RES, 1.5K
R162	0662057M98	RES, 10K
R171	0662057M94	RES, 6.8K
R202	0662057N27	RES, 150K
R205	0662057M50	RES, 100
R206	NOT PLACED	RES, 100
R212	0662057C01	RES, 0
R220	0662057M54	RES, 150
R221	0662057M54	RES, 150
R223	0662057M50	RES, 100
R227	0662057N27	RES, 150K
R230	0662057N24	RES, 110K
R243	0662057M80	RES, 180
R244	0662057M43	RES, 51
R245	0662057M78	RES, 1.5K
R246	0662057N23	RES, 100K
R247	0662057N28	RES, 160K
R248	0662057M43	RES, 51
R253	0662057M42	RES, 47
R254	0662057M58	RES, 220
R255	0662057U91	RES, 3.9K
R261	0662057N12	RES, 36K
R262	0662057M94	RES, 6.8K
R263	0662057M37	RES, 30
R264	0662057M58	RES, 220
R270	0662057M32	RES, 18
R271	0662057M96	RES, 8.2K
R272	0662057M97	RES, 9.1K
R273	0662057M61	RES, 300
R274	0662057M38	RES, 33
R275	0662057M01	RES, 0
R276	0662057M74	RES, 1K
R280	0662057M94	RES, 6.8K
R281	0662057M97	RES, 9.1K
R282	0662057M71	RES, 750
R283	0662057M56	RES, 180
R284	0662057M70	RES, 680
R286	0662057M01	RES, 0
R310	0662057N23	RES, 100K
R311	0662057N23	RES, 100K
R312	0662057N06	RES, 20K
R313	0662057M91	RES, 5.1K
R320	0662057V43	RES, 330K
R321	0662057V35	RES, 200K
R322	0662057N23	RES, 100K
R400	NOT PLACED	RES, 100K
R401	0662057N34	RES, 300K
R402	0662057M98	RES, 10K
R403	0662057M98	RES, 10K
R404	0662057N16	RES, 51K
R405	0662057N34	RES, 300K
R406	0662057N31	RES, 220K
R407	0662057N23	RES, 100K
R408	0662057N23	RES, 100K
R409	0662057N05	RES, 18K
R410	0662057M98	RES, 10K
R411	0662057M72	RES, 820
R412	0662057N23	RES, 100K
R413	0662057N23	RES, 100K
R414	0662057N11	RES, 33K
R415	0662057N11	RES, 33K
R416	0662057N06	RES, 20K
R417	0662057M98	RES, 10K
R418	0662057N23	RES, 100K
R419	0662057M90	RES, 4.7K
R420	0662057V35	RES, 200K
R421	0662057V27	RES, 100K
R422	0662057N23	RES, 100K
R423	0662057N23	RES, 100K
R424	0662057V35	RES, 200K
R425	0662057V27	RES, 100K
R430	0662057N23	RES, 100K
R431	NOT PLACED	RES, 100K
R432	0662057M01	RES, 0
R433	0662057N23	RES, 100K
R434	NOT PLACED	RES, 100K
R440	0662057M90	RES, 4.7K
R441	0662057M90	RES, 4.7K
R442	0662057A33	RES, 220
R443	0662057A27	RES, 120
R445	0662057M90	RES, 4.7K
R446	0662057M98	RES, 10K
R451	0662057N15	RES, 47K
R460	0662057N08	RES, 24K
R462	0662057N08	RES, 24K
R463	0662057N08	RES, 24K
R464	0662057N10	RES, 30K
R469	0662057M26	RES, 10
R470	0662057M82	RES, 2.2K
R471	0662057M82	RES, 2.2K
R472	0662057M70	RES, 680
R473	0662057M70	RES, 680
R474	0662057A37	RES, 330
R475	0662057N29	RES, 180K
R476	0662057N23	RES, 100K
R477	0662057M82	RES, 2.2K
R478	0662057M82	RES, 2.2K
R479	0662057N23	RES, 100K
R480	0662057B47	RES, 0
R481	NOT PLACED	RES, 100K
R482	NOT PLACED	RES, 330K
R483	NOT PLACED	RES, 150K
R484	NOT PLACED	RES, 2.2K
R485	NOT PLACED	RES, 100K
R486	NOT PLACED	RES, 100K
R487	0662057M01	RES, 0
R488	0662057N35	RES, 330K
R489	NOT PLACED	RES, 91K
R490	NOT PLACED	RES, 2.2K
R491	0662057M01	RES, 0
R492	0662057N08	RES, 24K
R493	0662057N35	RES, 330K
R494	0662057V43	RES, 330K
R495	0662057M92	RES, 5.6K
R496	NOT PLACED	RES, 10K
R497	NOT PLACED	RES, 1MEG
R498	NOT PLACED	RES, 47K
R499	NOT PLACED	RES, 270K
R501	0662057M50	RES, 100
R502	0662057M50	RES, 100
R503	0662057M50	RES, 100
R504	0662057M50	RES, 100
R505	0662057M50	RES, 100
R506	0662057M50	RES, 100
R507	0662057M50	RES, 100
R508	0662057N23	RES, 100K
R509	0662057N23	RES, 100K
R510	0662057N35	RES, 330K
R511	0662057N23	RES, 100K
R512	0662057N27	RES, 150K
R513	NOT PLACED	RES, 100K
R514	0662057N23	RES, 100K
R515	NOT PLACED	RES, 0
R516	NOT PLACED	RES, 0
R517	0662057M01	RES, 0
R518	0662057N31	RES, 220K
R519	0662057N23	RES, 100K
R520	0662057N23	RES, 100K
R521	NOT PLACED	RES, 100K
R522	0662057N23	RES, 100K
R523	0662057M98	RES, 10K
R524	0662057M98	RES, 10K
S440	4080710Z22 & 4080710Z15	switch, rotary, 16 and 32/64 - channel select
S441	4070354A01	pushbutton switch, PTT
S442	4070354A01	pushbutton switch, side option (lower)
S443	4070354A01	pushbutton switch, side option (upper)

Circuit Ref	Motorola Part No.	Description
S444	1880619Z02	switch, rotary on-off, with 10K volume control
SH1	2686421Z01	shield, comp side, RF front end
SH40	2686419Z01	shield, solder side, first mixer
SH50	2686423Z01	shield, solder side, IFIC and 2nd LO crystal
SH52	2686424Z01	shield, solder side, high IF crystal filter
SH100	2686418Z01	shield, solder side, transmitter
SH200	2686424Z01	shield, solder side, synthesizer charge pump
SH201	2686423Z01	shield, comp side, synthesizer
SH250	2686425Z01	shield, comp side, VCO tank circuits
SH251	2686425Z01	shield, solder side, VCOBIC
SH253	2686422Z01	shield, comp side, VCO RX injection buffer
SH400	2686420Z02	shield, solder side, microprocessor
SH401	2686420Z01	shield, comp side, memory
T41	2580541Z02	transformer, balun
T42	2580541Z02	transformer, balun
U51	5186144B01	receiver system (IFIC), SA616
U52	5109522E10	triple inverter, TC7W04F
U110	0186438Z01	transmitter PA module, RA07M1317M_VHF
U150	5113818A01	dual op amp, LM2904
U151	2484657R01	bead, 57R01
U201*	5185963A27	frequency synthesizer, 63A27
U251	5105750U54	VCO/buffer, 50U54
U310	5102478J01	5 V voltage regulator, TK71750S
U320	5185963A55	adjustable voltage regulator w/ reset, LP2986
U330	5102479J01	3 V voltage regulator, TK71730S
U403	NOT PLACED	SRM2B256
U425	5162852A09	LOW PWR OP AMP W/RAIL TO RAIL
U451	5185130C53	audio filter (ASFIC.cmp), 30C53
U480	NOT PLACED	LM2904
U490	5108858K99	audio power amplifier, TDA8541
U510	5113818A01	dual op amp, LM2904
U511	4802245J54	dual digital NPN, UMG5
U401*	5102226J56	microprocessor, MC68HC11FL0
U402*	5102463J64	serial EEPROM 16Kx8, X25128-2.7
U404*	5102480J01	Flash ROM 128Kx8, AT49LV001N_70VI
VR110	4813830A82	zener diode, 4.3 V, MM3Z4V3T1
VR301	4813830A33	zener diode, 20 V, MMBZ5250B
VR302	4813830A33	zener diode, 20 V, MMBZ5250B
VR471	4813830A18	zener diode, 6.8 V, MMBZ5235B
VR472	4813830A09	zener diode, 3.3 V, MMBZ5226B
VR473	4813830A33	zener diode, 20 V, MMBZ5250B
VR474	4813830A33	zener diode, 20 V, MMBZ5250B
VR475	4880140L20	zener diode, 15 V, MMBZ5245B
Y51	4802245J84	crystal, 44.395 MHz
Y70	9186145B02	ceramic discriminator, 455 kHz, 45B02
Y201*	4880114R06	crystal, 16.8 MHz, 14R06
Y202	NOT PLACED	45J68

* Motorola Depot Servicing only

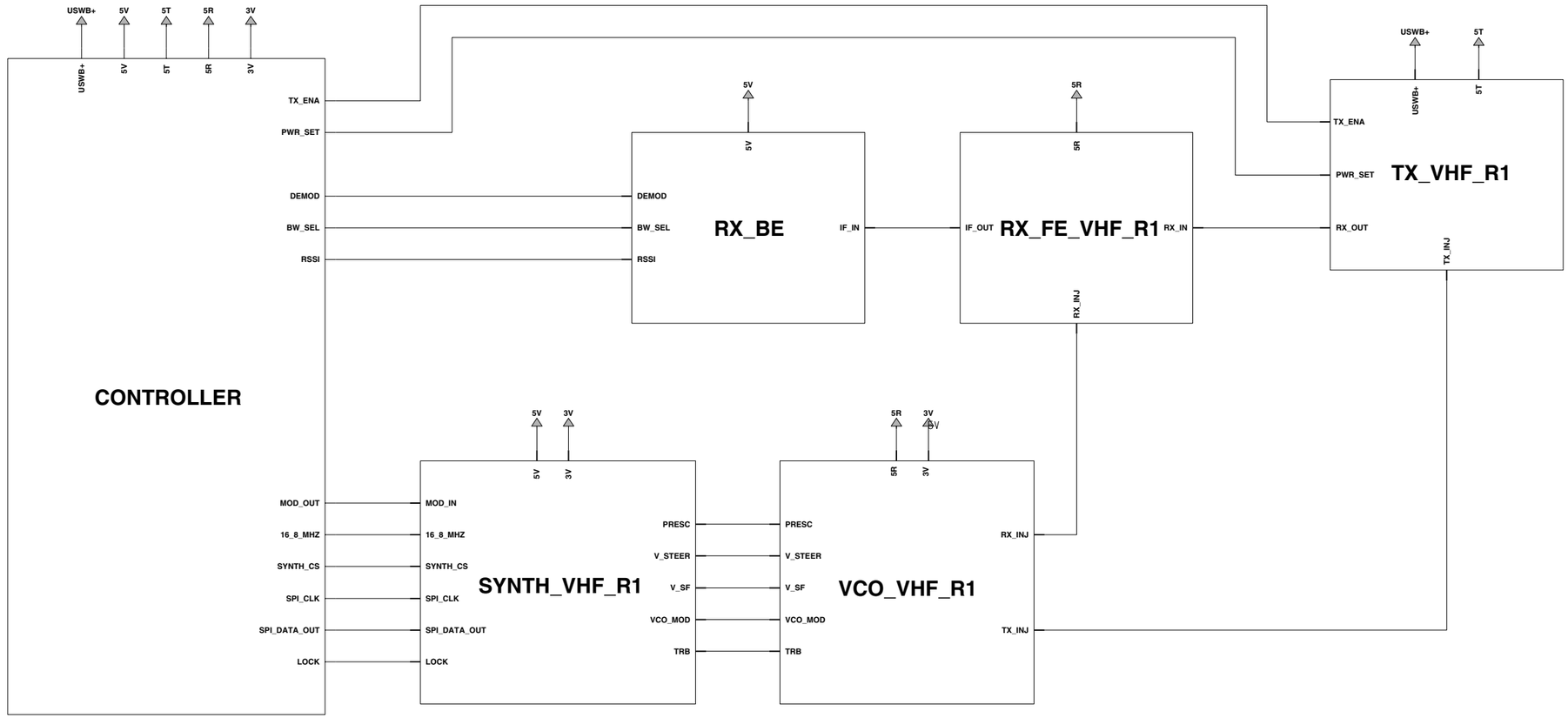


Figure 7-15. VHF (136–162 MHz) Radio Circuit Block Interconnect Diagram (8486769Z04-C/05-D)

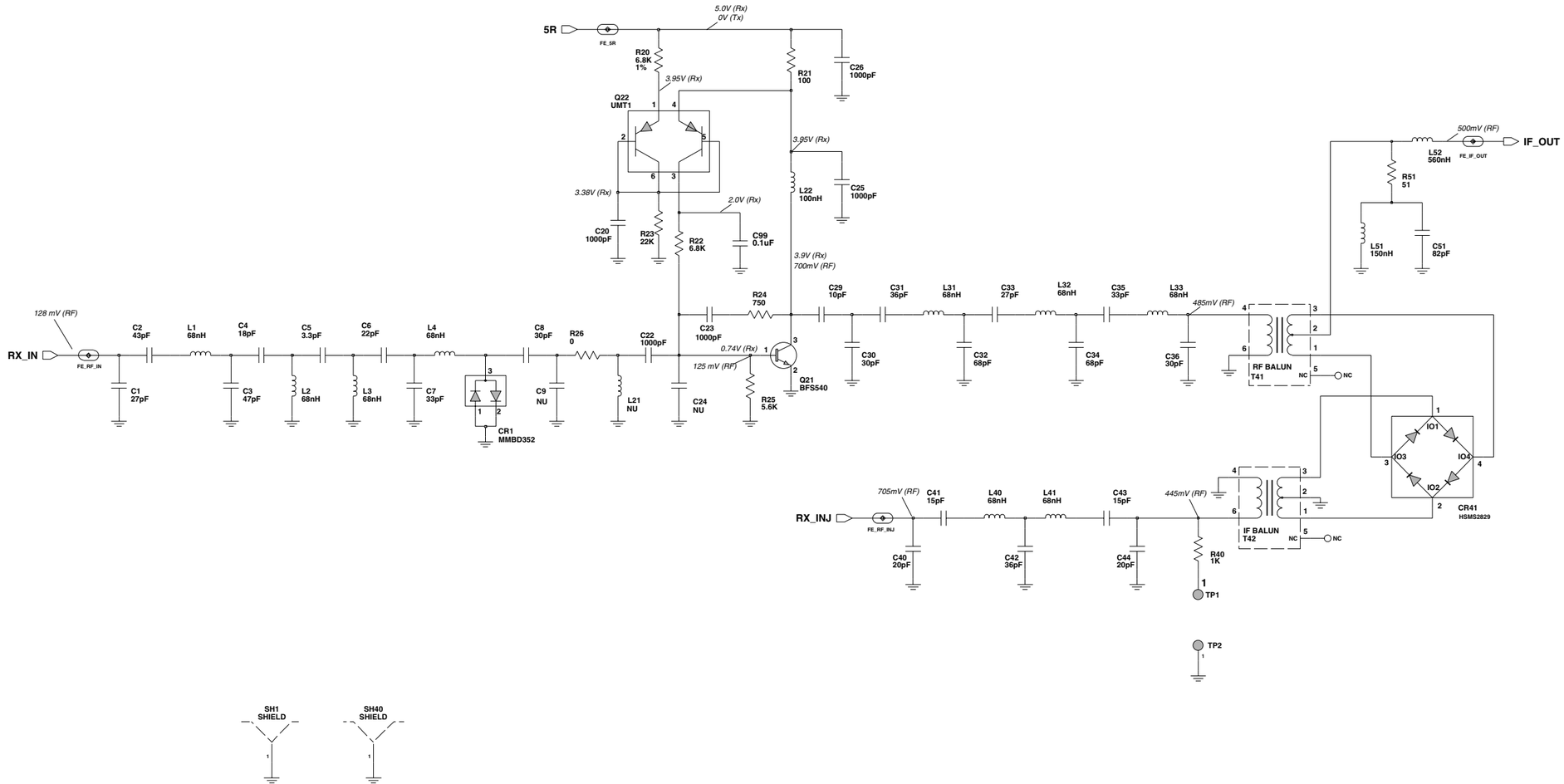


Figure 7-16. VHF (136–162 MHz) Receiver Front End Schematic Diagram (8486769Z04-C/05-D)

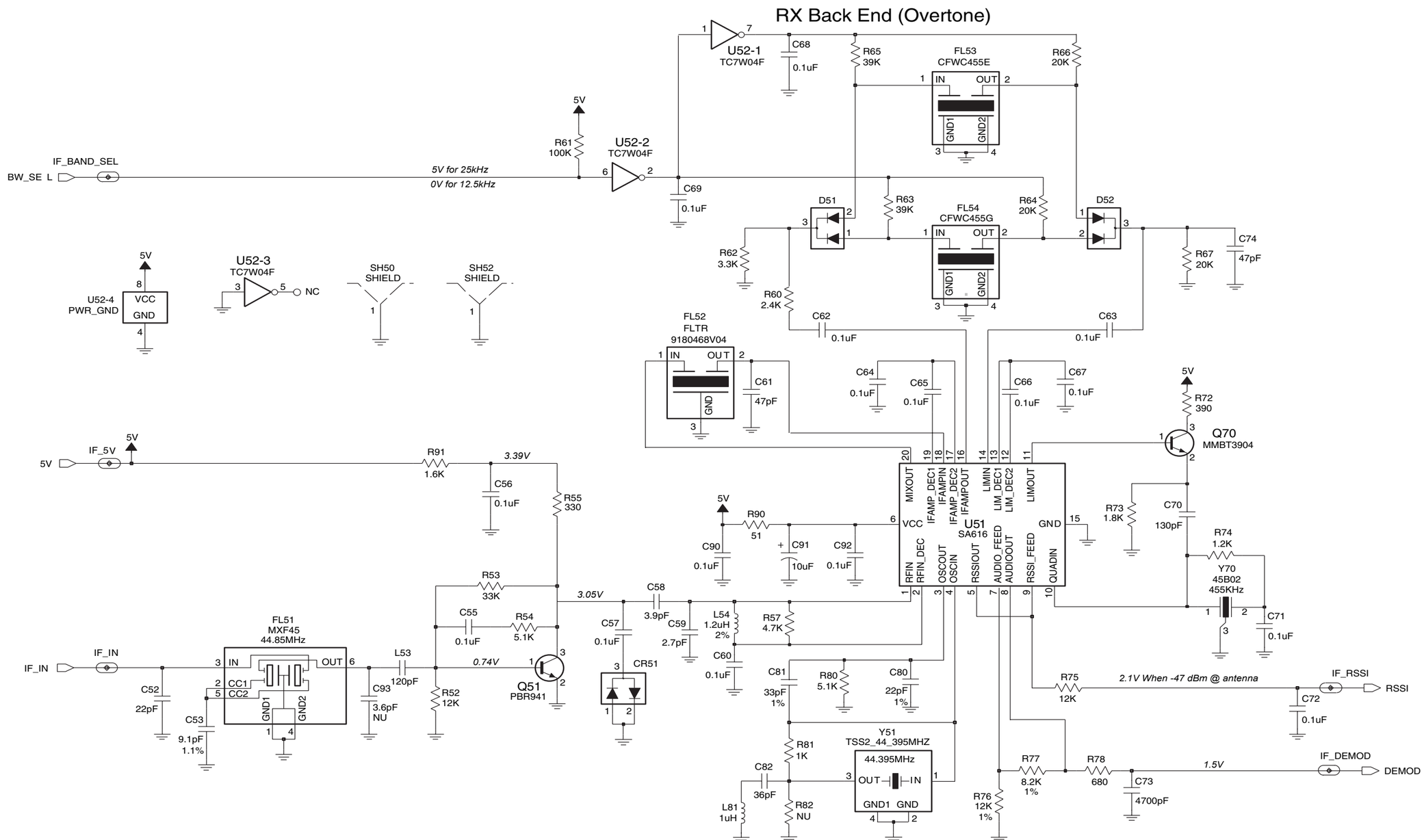
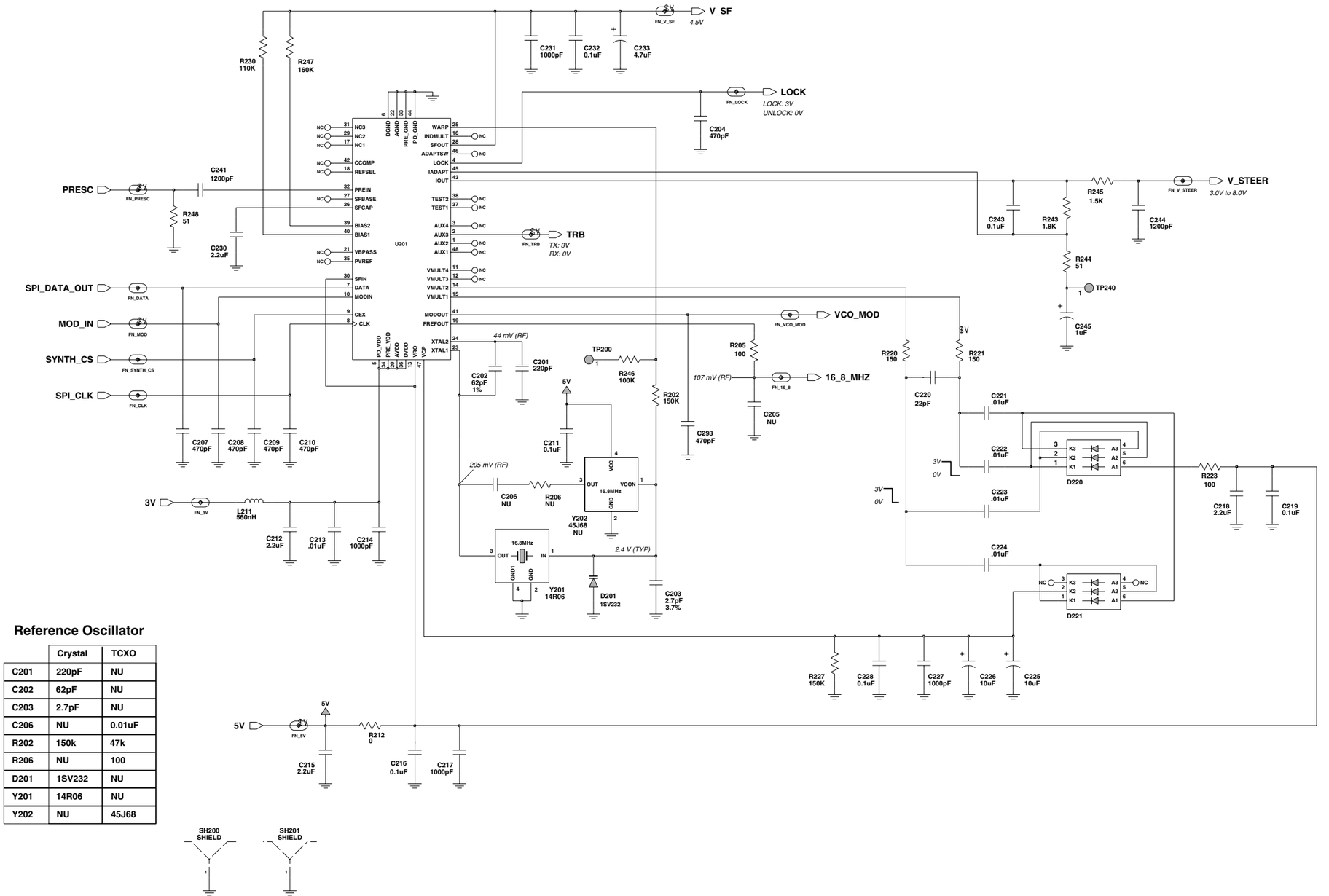


Figure 7-17. VHF (136–162 MHz) Receiver Back End Schematic Diagram (8486769Z04-C/05-D)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 7-18. VHF (136–162 MHz) Synthesizer Schematic Diagram (8486769Z04-C/05-D)

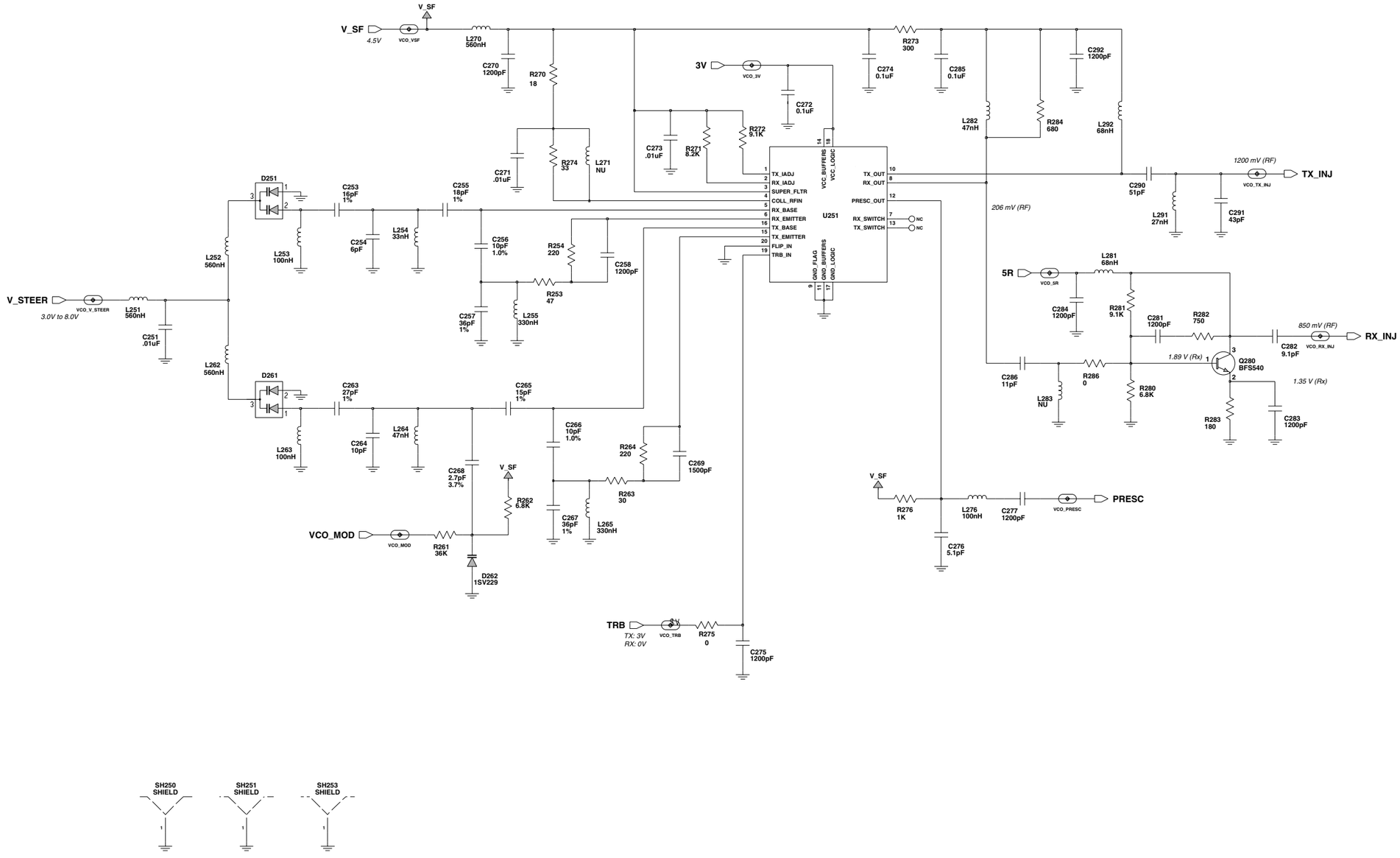


Figure 7-19. VHF (136–162 MHz) Voltage Controlled Oscillator Schematic Diagram (8486769Z04-C/05-D)

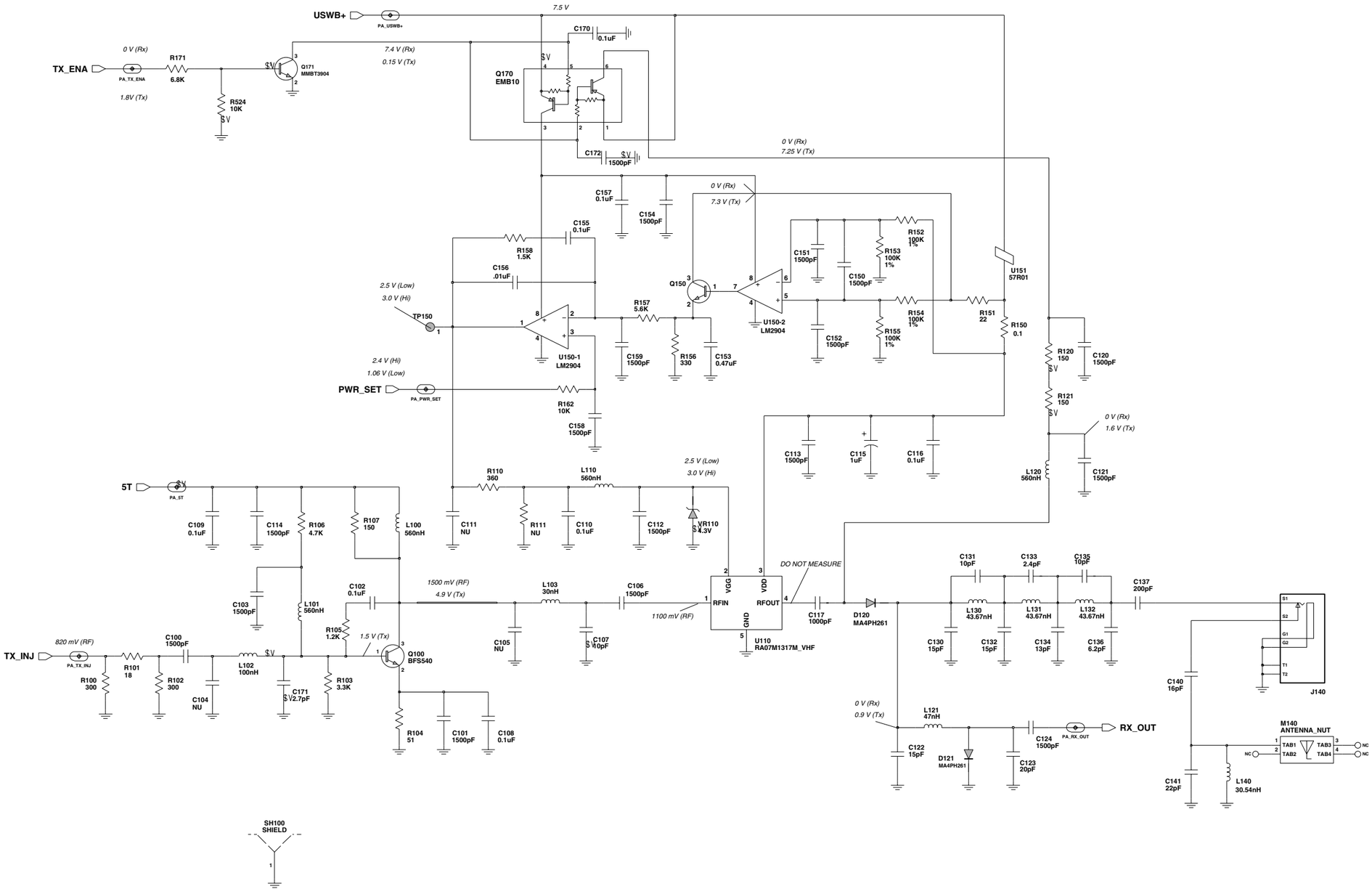


Figure 7-20. VHF (136–162 MHz) Transmitter and Power Control Schematic Diagram (8486769Z04-C/05-D)

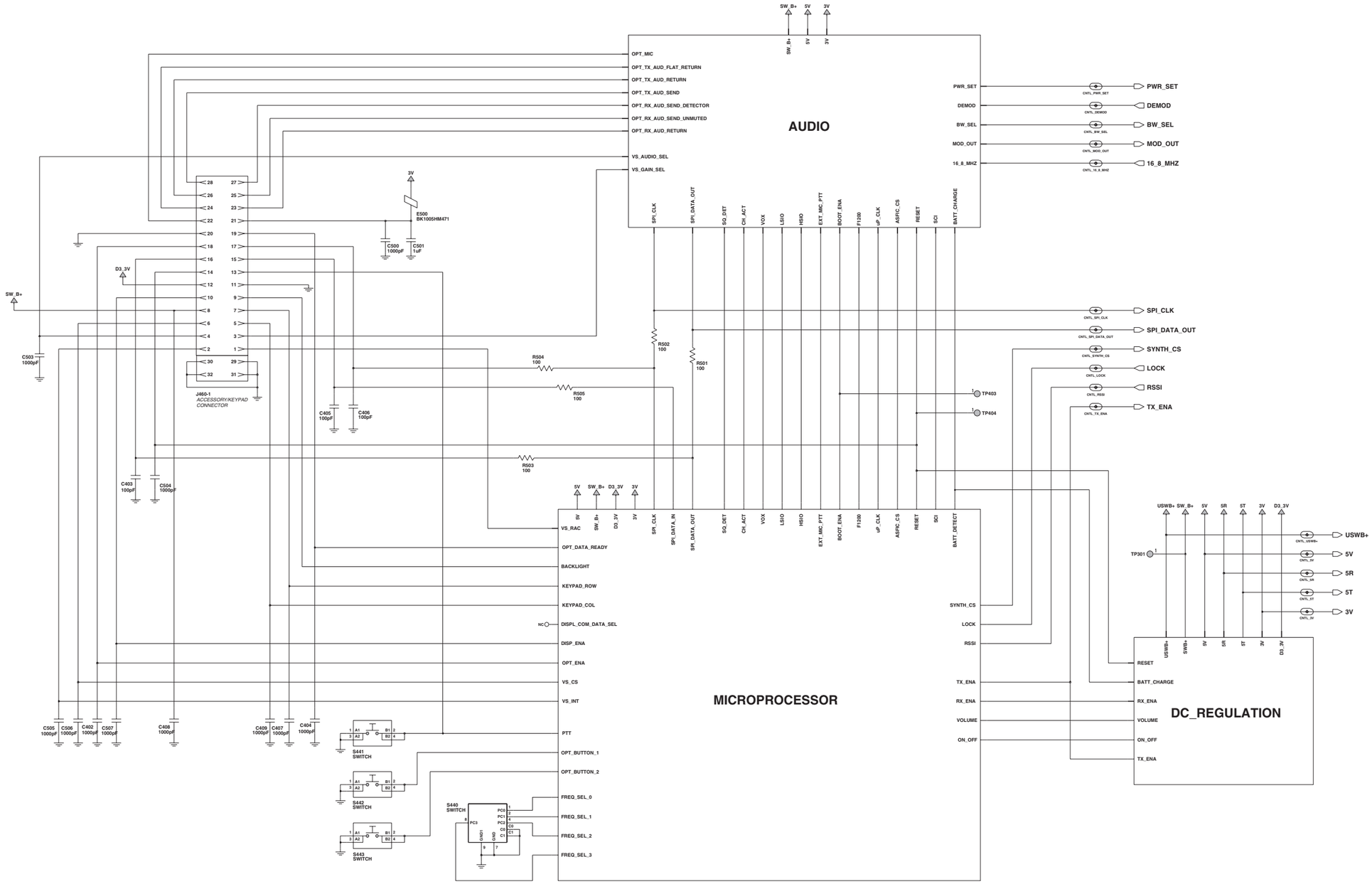


Figure 7-21. VHF (136–162 MHz) Controller Interconnect Schematic Diagram (8486769Z04-C/05-D)

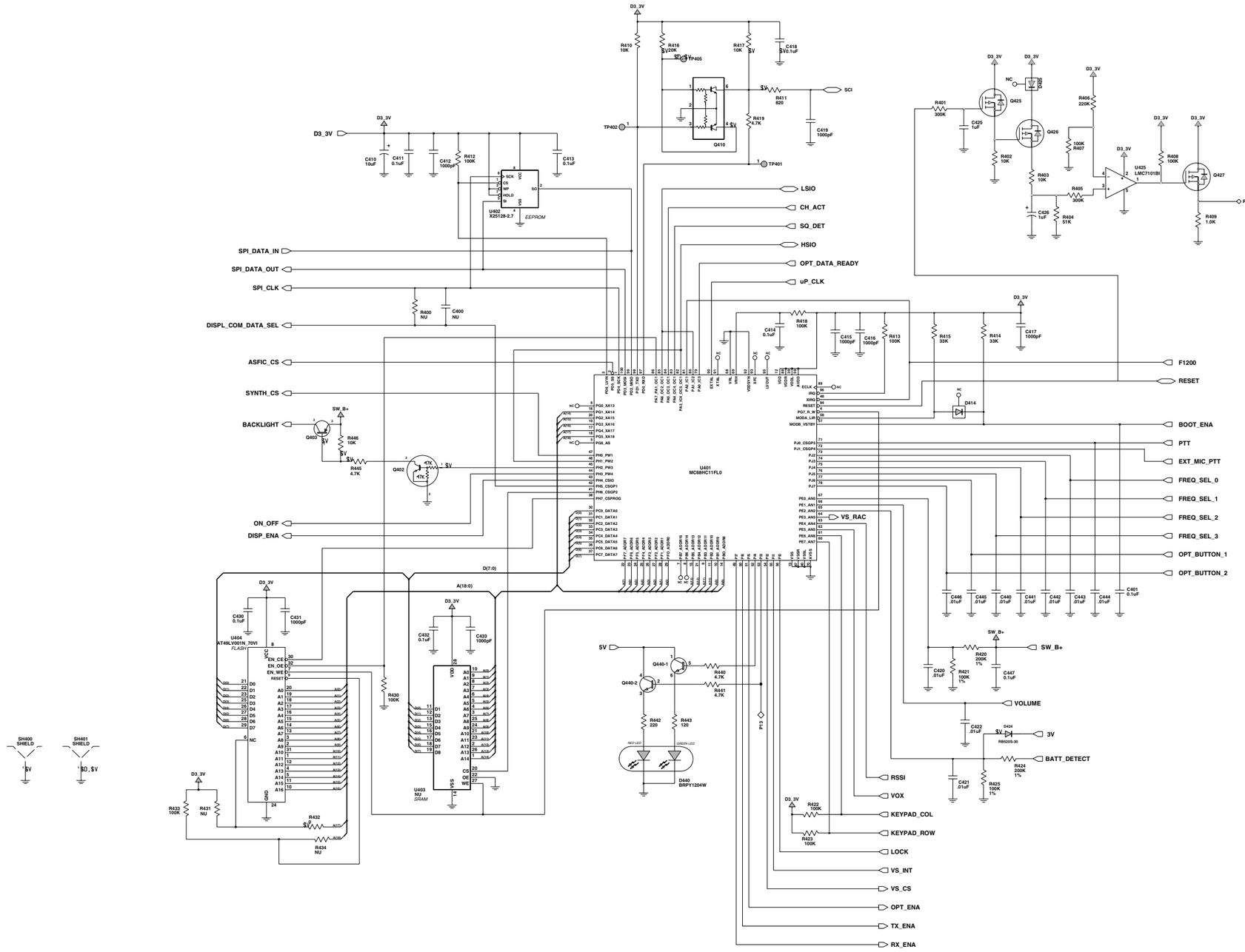


Figure 7-22. VHF (136–162 MHz) Microprocessor Circuitry Schematic Diagram (8486769Z04-C/05-D)

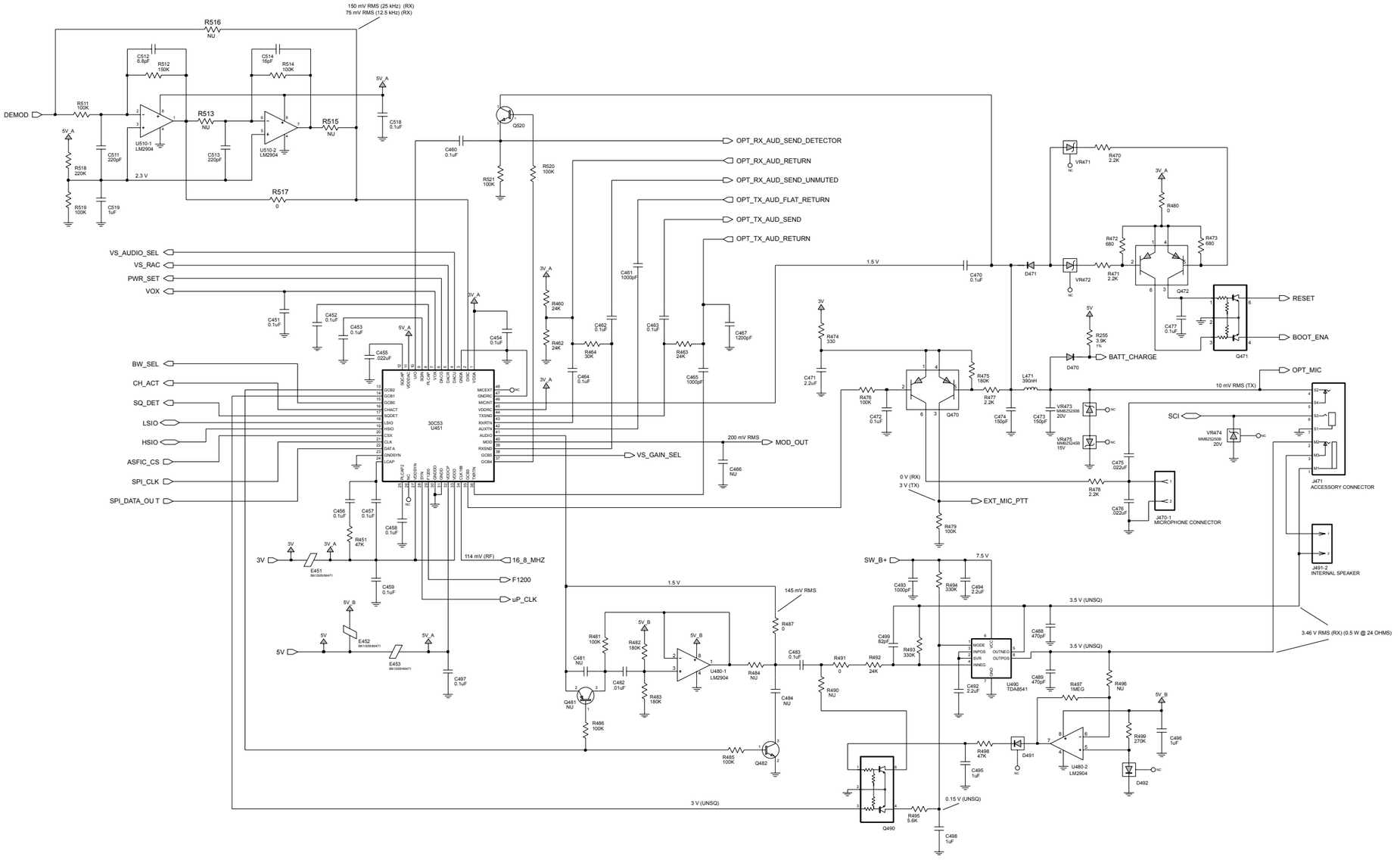


Figure 7-23. VHF (136–162 MHz) Audio Circuitry Schematic Diagram (8486769Z04-C/05-D)

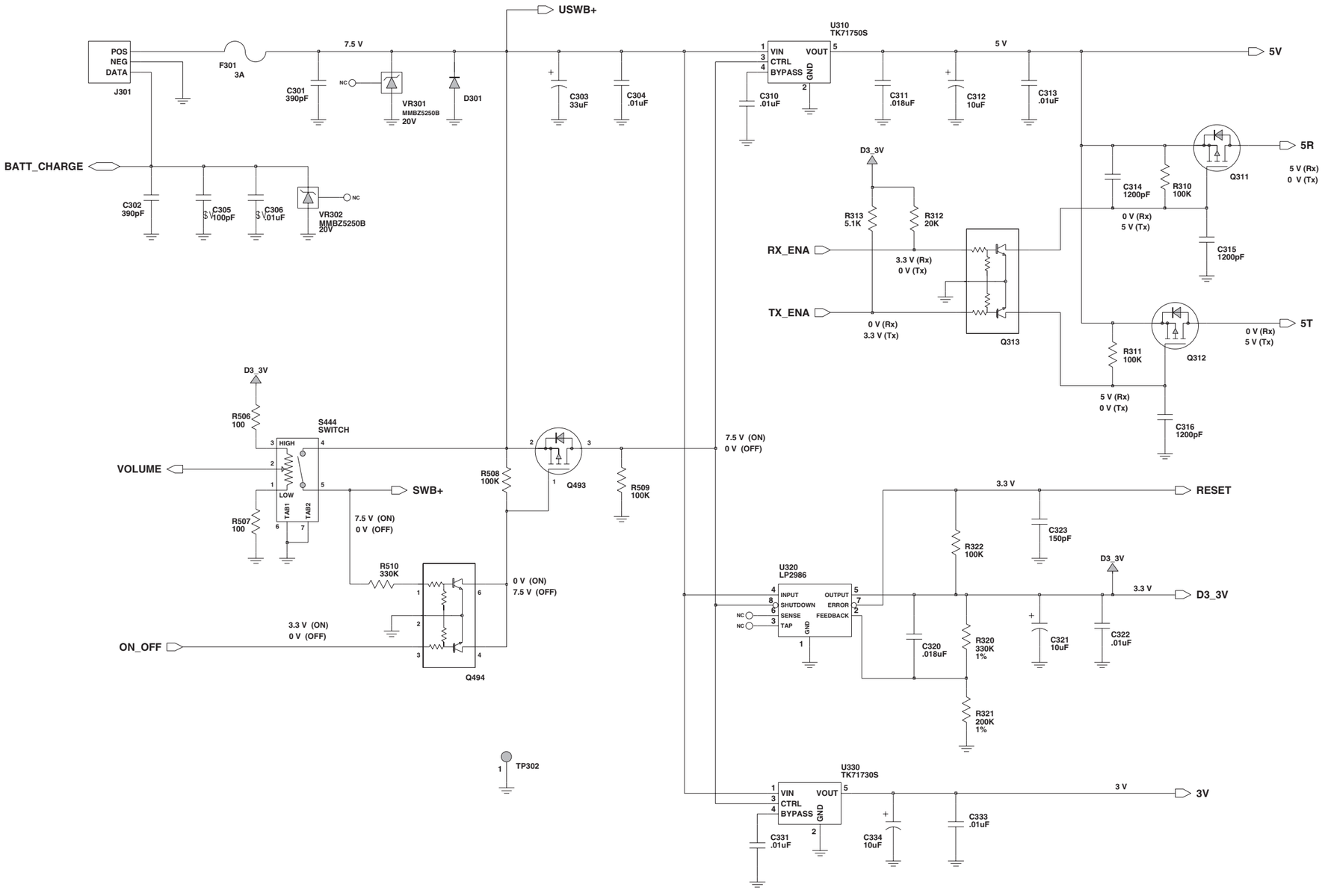
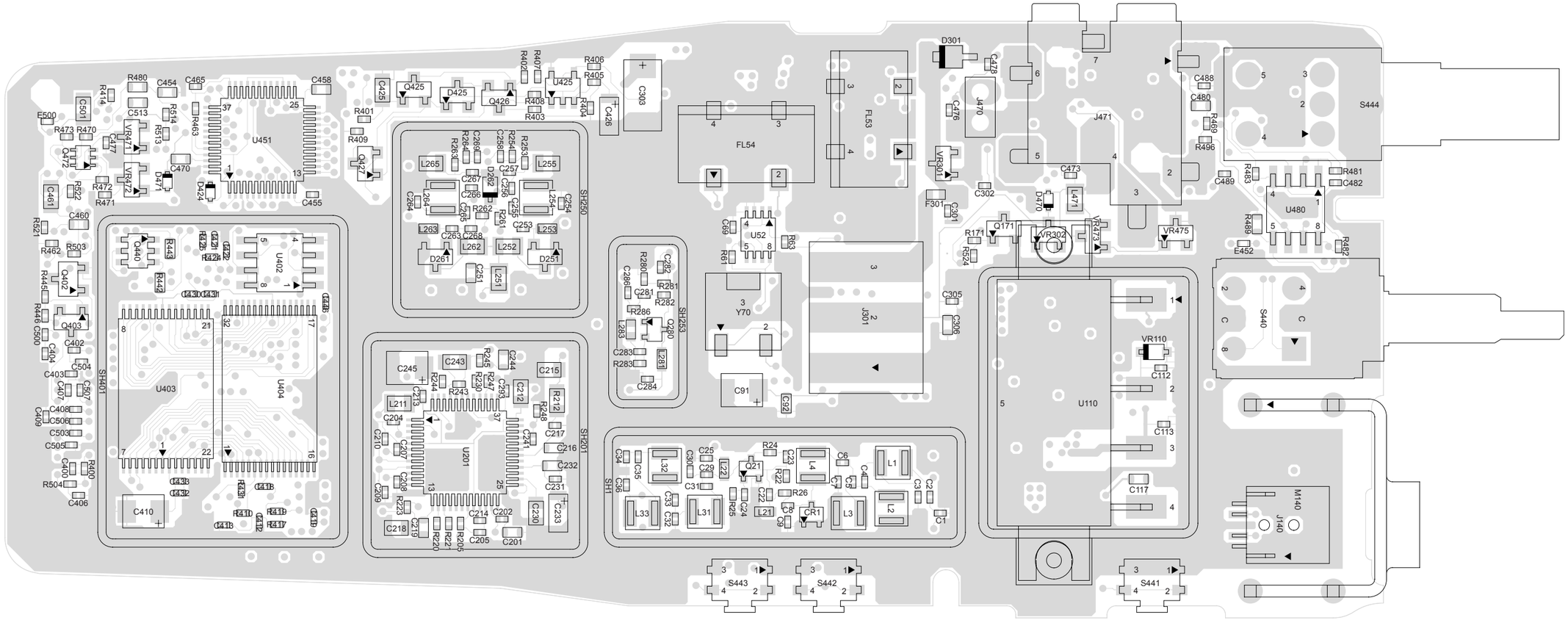


Figure 7-24. VHF (136–162 MHz) DC Regulation Schematic Diagram (8486769Z04-C/05-D)



ZMY30000-O

Figure 7-25. VHF (136–162 MHz) Board Component Side View (8486769Z04-C/05-D)

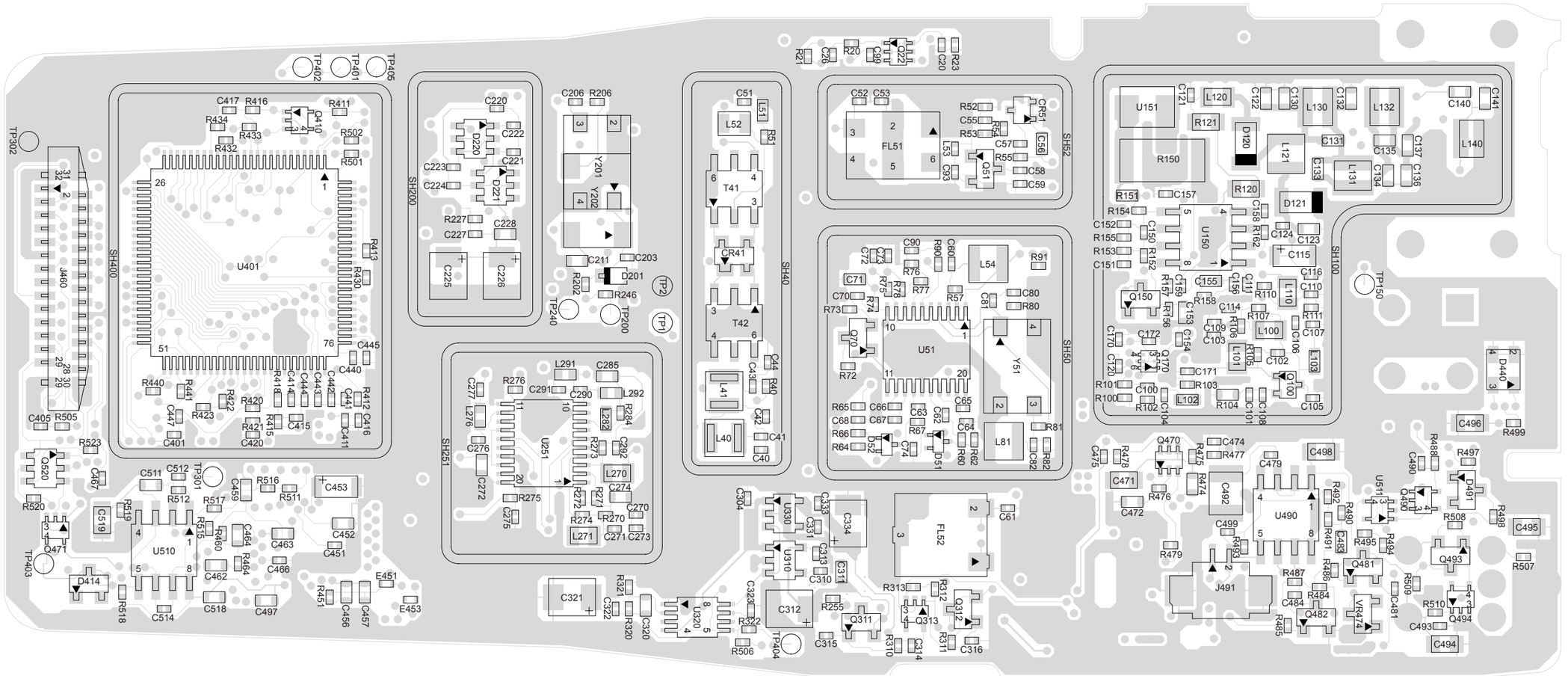


Figure 7-26. VHF (136–162 MHz) Board Solder Side View (8486769Z04-C/05-D)

VHF (136–162 MHz) Radio Parts List (8486769Z04-C)

Circuit Ref	Motorola Part No.	Description
C1	2115153H43	CAP, 22pF
C2	2115153H48	CAP, 36pF
C3	2115153H49	CAP, 47pF
C4	2115153H39	CAP, 18pF
C5	2115153H15	CAP, 3.3
C6	2115153H41	CAP, 22pF
C7	2115153H45	CAP, 33pF
C8	2115153H44	CAP, 30pF
C9	NOT PLACED	64AM DUMMY PART NUMBER
C20	2113945A09	CAP, 1000pF
C22	2113945A09	CAP, 1000pF
C23	2113945A09	CAP, 1000pF
C24	NOT PLACED	64AM DUMMY PART NUMBER
C25	2113945A09	CAP, 1000pF
C26	2113945A09	CAP, 1000pF
C29	2115153H27	CAP, 10pF
C30	2115153H44	CAP, 30pF
C31	2115153H46	CAP, 36pF
C32	2115153H53	CAP, 68pF
C33	2115153H43	CAP, 27pF
C34	2115153H53	CAP, 68pF
C35	2115153H45	CAP, 33pF
C36	2115153H44	CAP, 30pF
C40	2115153H40	CAP, 20pF
C41	2115153H37	CAP, 15pF
C42	2115153H46	CAP, 36pF
C43	2115153H37	CAP, 15pF
C44	2115153H40	CAP, 20pF
C51	2113944A38	CAP, 82pF
C52	2115153H41	CAP, 22pF
C53	2115153H26	CAP, 9.1pF
C55	2113946K02	CAP, 100000pF
C56	2113945C31	CAP, 0.10uF
C57	2113946K02	CAP, 100000pF
C58	2113944A15	CAP, 25pF
C59	2113944A11	CAP, 2.7pF
C60	2113946K02	CAP, 100000pF
C61	2113944A36	CAP, 68pF
C62	2113946K02	CAP, 100000pF
C63	2113946K02	CAP, 100000pF
C64	2113946K02	CAP, 100000pF
C65	2113946K02	CAP, 100000pF
C66	2113946K02	CAP, 100000pF
C67	2113946K02	CAP, 100000pF
C68	2113946K02	CAP, 100000pF
C69	2113946K02	CAP, 100000pF
C70	2113944A87	CAP, 130pF
C71	2113945C31	CAP, 0.10uF
C72	2113946K02	CAP, 100000pF
C73	2113945A13	CAP, 4700pF
C74	2113944A33	CAP, 47pF
C80	2115153H41	CAP, 22pF
C81	2115153H45	CAP, 33pF
C82	2115153H46	CAP, 36pF
C90	2113946K02	CAP, 100000pF
C91	2313960D07	CAP, 10uF
C92	2113945C31	CAP, 0.10uF
C93	NOT PLACED	64AM DUMMY PART NUMBER
C99	2113946K02	CAP, 100000pF
C100	2113945A10	CAP, 1500pF
C101	2113945A10	CAP, 1500pF
C102	2113946K02	CAP, 100000pF
C103	2113945A10	CAP, 1500pF
C104	NOT PLACED	64AM DUMMY PART NUMBER
C105	NOT PLACED	64AM DUMMY PART NUMBER
C106	2113945A10	CAP, 1500pF
C107	2113944A25	CAP, 10pF
C108	2113946K02	CAP, 100000pF
C109	2113946K02	CAP, 100000pF
C110	2113946K02	CAP, 100000pF
C111	NOT PLACED	64AM DUMMY PART NUMBER
C112	2113945A10	CAP, 1500pF
C113	2113945A10	CAP, 1500pF
C114	2113945A10	CAP, 1500pF
C115	2313960B01	CAP, 1uF
C116	2113946K02	CAP, 100000pF
C117	2113945L25	CAP, 1000pF
C120	2113945A10	CAP, 1500pF
C121	2113945A10	CAP, 1500pF
C122	2113944C32	CAP, 15pF
C123	2113944C80	CAP, 20pF
C124	2113945A10	CAP, 1500pF
C130	2113944C32	CAP, 15pF
C131	2113944C30	CAP, 10pF
C132	2113944C32	CAP, 15pF
C133	2113944C15	CAP, 2.4pF
C134	2113944C78	CAP, 13pF
C135	2113944C30	CAP, 10pF
C136	2113944C72	CAP, 6.2pF
C137	2113944C89	CAP, 20pF0
C140	2113944C79	CAP, 16pF
C141	2113944C34	CAP, 22pF
C150	2113945A10	CAP, 1500pF
C151	2113945A10	CAP, 1500pF
C152	2113945A10	CAP, 1500pF
C153	2113946L04	CAP, 0.47uF
C154	2113945A10	CAP, 1500pF
C155	2113945C31	CAP, 0.10uF
C156	2113945B02	CAP, 10000pF
C157	2113946K02	CAP, 100000pF
C158	2113945A10	CAP, 1500pF
C159	2113945A10	CAP, 1500pF
C170	2113946K02	CAP, 100000pF
C171	2113944A11	CAP, 2.7pF
C172	2113945A10	CAP, 1500pF
C201	2113944C02	CAP, 220pF
C202	2115153H52	CAP, 68pF
C203	2115153H13	CAP, 2.7pF
C204	2113945A05	CAP, 470pF
C205	NOT PLACED	64AM DUMMY PART NUMBER
C206	NOT PLACED	64AM DUMMY PART NUMBER
C207	2113945A05	CAP, 470pF
C208	2113945A05	CAP, 470pF
C209	2113945A05	CAP, 470pF
C210	2113945A05	CAP, 470pF
C211	2113945C31	CAP, 0.10uF
C212	2113946N03	CAP, 2.2uF
C213	2113945B02	CAP, 10000pF
C214	2113945A09	CAP, 1000pF
C215	2113946N03	CAP, 2.2uF
C216	2113945C31	CAP, 0.10uF
C217	2113945A09	CAP, 1000pF
C218	2113946N03	CAP, 2.2uF
C219	2113945C31	CAP, 0.10uF
C220	2113944A29	CAP, 22pF
C221	2113945B02	CAP, 10000pF
C222	2113945B02	CAP, 10000pF
C223	2113945B02	CAP, 10000pF
C224	2113945B02	CAP, 10000pF
C225	2313960D07	CAP, 10uF
C226	2313960D07	CAP, 10uF
C227	2113945A09	CAP, 1000pF
C228	2113945C31	CAP, 0.10uF
C230	2113946N03	CAP, 2.2uF
C231	2113945A09	CAP, 1000pF
C232	2113945C31	CAP, 0.10uF
C233	2313960B30	CAP, 4.7pF
C241	2113945A60	CAP, 1200pF
C243	2113945G91	CAP, 100000pF
C244	2113945L27	CAP, 1200pF
C245	2313960C26	KEMET CAP
C251	2113945L49	CAP, 1000pF
C253	2115153H38	CAP, 16pF
C254	2115153H30	CAP, 6pF
C255	2115153H39	CAP, 18pF
C256	2115153H27	CAP, 10pF
C257	2115153H46	CAP, 36pF
C258	2113945A60	CAP, 1200pF
C263	2115153H43	CAP, 27pF
C264	2115153H27	CAP, 10pF
C265	2115153H37	CAP, 15pF
C266	2115153H27	CAP, 10pF
C267	2115153H46	CAP, 36pF
C268	2115153H13	CAP, 2.7pF
C269	2113945A10	CAP, 1500pF
C270	2113945A60	CAP, 1200pF
C271	2113945B02	CAP, 10000pF
C272	2113945C31	CAP, 0.10uF
C273	2113945B02	CAP, 10000pF
C274	2113945C31	CAP, 0.10uF
C275	2113945A60	CAP, 1200pF
C276	2113944A18	CAP, 5.1pF
C277	2113945A60	CAP, 1200pF
C281	2113945A60	CAP, 1200pF
C282	2113944A24	CAP, 9.1pF
C283	2113945A60	CAP, 1200pF
C284	2113945A60	CAP, 1200pF
C285	2113945C31	CAP, 0.10uF
C286	2113944A77	CAP, 11pF
C290	2113944A85	CAP, 51pF
C291	2115153H48	CAP, 43pF
C292	2113945A60	CAP, 1200pF
C293	2113945A05	CAP, 470pF
C301	2113945A04	CAP, 390pF
C302	2113945A04	CAP, 390pF
C303	2313960F04	CAP, 33uF
C304	2113945B02	CAP, 10000pF
C305	2113944A40	CAP, 100pF
C306	2113945L49	CAP, 1000pF
C310	2113945B02	CAP, 10000pF
C311	2113743E05	CAP, 0.18uF
C312	2313960D07	CAP, 10uF
C313	2113945B02	CAP, 10000pF
C314	2113945A60	CAP, 1200pF
C315	2113945A60	CAP, 1200pF
C316	2113945A60	CAP, 1200pF
C320	2113743E05	CAP, 0.18uF
C321	2313960D07	CAP, 10uF
C322	2113945B02	CAP, 10000pF
C323	2113944A42	CAP, 150pF
C331	2113945B02	CAP, 10000pF
C333	2113945B02	CAP, 10000pF
C334	2313960D07	CAP, 10uF
C400	NOT PLACED	64AM DUMMY PART NUMBER

Circuit Ref	Motorola Part No.	Description
C401	2113946K02	CAP, 100000pF
C402	2113945A09	CAP, 1000pF
C403	2113944A40	CAP, 100pF
C404	2113945A09	CAP, 1000pF
C405	2113944A40	CAP, 100pF
C406	2113944A40	CAP, 100pF
C407	2113945A09	CAP, 1000pF
C408	2113945A09	CAP, 1000pF
C409	2113945A09	CAP, 1000pF
C410	2313960D07	CAP, 10uF
C411	2113946K02	CAP, 100000pF
C412	2113945A09	CAP, 1000pF
C413	2113946K02	CAP, 100000pF
C414	2113946K02	CAP, 100000pF
C415	2113945A09	CAP, 1000pF
C416	2113945A09	CAP, 1000pF
C417	2113945A09	CAP, 1000pF
C418	2113946K02	CAP, 100000pF
C419	2113945A09	CAP, 1000pF
C420	2113945B02	CAP, 10000pF
C421	2113945B02	CAP, 10000pF
C422	2113945B02	CAP, 10000pF
C425	2113946E02	CAP, 1uF
C426	2313960B01	CAP, 1uF
C430	2113946K02	CAP, 100000pF
C431	2113945A09	CAP, 1000pF
C432	2113946K02	CAP, 100000pF
C433	2113945A09	CAP, 1000pF
C440	2113945B02	CAP, 10000pF
C441	2113945B02	CAP, 10000pF
C442	2113945B02	CAP, 10000pF
C443	2113945B02	CAP, 10000pF
C444	2113945B02	CAP, 10000pF
C445	2113945B02	CAP, 10000pF
C446	2113945B02	CAP, 10000pF
C447	2113946K02	CAP, 100000pF
C451	2113946K02	CAP, 100000pF
C452	2113945C31	CAP, 0.10uF
C453	2313960B30	CAP, 4.7pF
C454	2113945C31	CAP, 0.10uF
C455	2113945B04	CAP, 22000pF
C456	2113945C31	CAP, 0.10uF
C457	2113945C31	CAP, 0.10uF
C458	2113945C31	CAP, 0.10uF
C459	2113945C31	CAP, 0.10uF
C460	2113945C31	CAP, 0.10uF
C461	2113946F03	CAP, 4.7uF
C462	2113945C31	CAP, 0.10uF
C463	2113945C31	CAP, 0.10uF
C464	2113945C31	CAP, 0.10uF
C465	2113945A09	CAP, 1000pF
C466	NOT PLACED	64AM DUMMY PART NUMBER
C467	2113945A60	CAP, 1200pF
C470	2113945C31	CAP, 0.10uF
C471	2113946N03	CAP, 2.2uF
C472	2113945C31	CAP, 0.10uF
C473	2113944A42	CAP, 150pF
C474	2113944A42	CAP, 150pF
C475	2113945B04	CAP, 22000pF
C476	2113945B04	CAP, 22000pF
C477	2113946K02	CAP, 100000pF
C478	2113944A42	CAP, 150pF
C479	2113944A42	CAP, 150pF
C480	2113945C31	CAP, 0.10uF
C481	NOT PLACED	64AM DUMMY PART NUMBER
C482	NOT PLACED	64AM DUMMY PART NUMBER
C483	2113946C02	CAP, 0.22uF
C484	NOT PLACED	64AM DUMMY PART NUMBER
C488	2113945A05	CAP, 470pF
C489	2113945A05	CAP, 470pF
C490	2113945A05	CAP, 470pF
C492	2113928J08	CAP, 10uF
C493	2113945A09	CAP, 1000pF
C494	2113946N03	CAP, 2.2uF
C495	2113946N02	CAP, 1uF
C496	2113946N02	CAP, 1uF
C497	2113945C31	CAP, 0.10uF
C498	2113946N02	CAP, 1uF
C499	2113944A32	CAP, 39pF
C500	2113945A09	CAP, 1000pF
C501	2113946N02	CAP, 1uF
C503	2113945A09	CAP, 1000pF
C504	2113945A09	CAP, 1000pF
C505	2113945A09	CAP, 1000pF
C506	2113945A09	CAP, 1000pF
C507	2113945A09	CAP, 1000pF
C511	2113944C02	CAP, 220pF
C512	2113944A21	CAP, 6.8pF
C513	2113944C02	CAP, 220pF
C514	2113944A79	CAP, 16pF
C518	2113945C31	CAP, 0.10uF
C519	2113946N02	CAP, 1uF
CR1	4813974A19	Diode Schottky
CR41	4815923H01	Diode Schottky
CR51	4813974A19	Diode Schottky
D51	4815047H01	Switching Diode
D52	4815047H01	Switching Diode
D120	4880973Z02	Pin Diode
D121	4880973Z02	Pin Diode
D201	4815072H01	Diode Varactor
D220	4815011H01	Diode Triple
D221	4815011H01	Diode Triple
D251	4813974A01	ISV 228
D261	4813974A01	ISV 228
D262	4885055Y01	Diode Varactor
D301	4815713H01	Diode Schottky
D414	4816064H01	RH29M19 LH
D424	4809924D29	Diode High Voltage
D425	4816064H01	RH29M19 LH
D440	4805729G49	Diode Red/Yel
D470	4809924D29	Diode High Voltage
D471	4809924D29	Diode High Voltage
D491	NOT PLACED	64AM DUMMY PART NUMBER
E451	2480640Z01	Ferrite Bead
E452	2480640Z01	Ferrite Bead
E453	2480640Z01	Ferrite Bead
E500	2480640Z01	Ferrite Bead
F301	6515076H01	Fuse Chip SMT
FL51	9186801Z01	OSC,XTAL 44.85MHZ
FL52	9180468V04	4 Element FLTR
FL53	9180469V05	6 Element FLTR
FL54	9115811H01	6 Element FLTR
J140	0986428Z02	RF Jack
J301	0986565Z02	Battery CONN
J460	NOT PLACED	64AM DUMMY PART NUMBER
J470	0985818A02	CONN 2 Pin
J471	0980683Z03	Audio Jack
J491	2815162H01	CONN_P
L1	2414015C09	INDCTR, 68nH
L2	2414015C09	INDCTR, 68nH
L3	2414015C09	INDCTR, 68nH
L4	2414015C09	INDCTR, 68nH
L21	NOT PLACED	64AM DUMMY PART NUMBER
L22	2414017N24	INDCTR, 100nH
L31	2414015C09	INDCTR, 68nH
L32	2414015C09	INDCTR, 68nH
L33	2414015C09	INDCTR, 68nH
L40	2414015C09	INDCTR, 68nH
L41	2414015C09	INDCTR, 68nH
L51	2414017N26	INDCTR, 150nH
L52	2462587V43	INDCTR, 560nH
L53	2113944A41	CAP, 120 pF
L54	2414015A25	INDCTR, 1200nH
L81	2414015A19	INDCTR, 1000nH
L100	2414017K32	INDCTR, 560nH
L101	2414017K32	INDCTR, 560nH
L102	2415429H36	INDCTR, 100nH
L103	2415429H25	INDCTR, 30nH
L110	2414017K32	INDCTR, 560nH
L120	2414017K32	INDCTR, 560nH
L121	2415015H01	INDCTR, 47nH
L130	2479990N01	INDCTR, 43.67nH
L131	2479990N01	INDCTR, 43.67nH
L132	2479990N01	INDCTR, 43.67nH
L140	2479990M01	INDCTR, 30.54nH
L211	2414017K32	INDCTR, 560nH
L251	2414017K32	INDCTR, 560nH
L252	2414017K32	INDCTR, 560nH
L253	2415429H36	INDCTR, 100nH
L254	2414015C05	INDCTR, 33nH
L255	2414017K29	INDCTR, 330nH
L262	2414017K32	INDCTR, 560nH
L263	2415429H36	INDCTR, 100nH
L264	2414015C07	INDCTR, 47nH
L265	2414017K29	INDCTR, 330nH
L270	2414017K32	INDCTR, 560nH
L271	NOT PLACED	64AM DUMMY PART NUMBER
L276	2414017N24	INDCTR, 100nH
L281	2414017N22	INDCTR, 68nH
L282	2414017N20	INDCTR, 47nH
L283	NOT PLACED	64AM DUMMY PART NUMBER
L291	2414017N17	INDCTR, 27nH
L292	2414017N22	INDCTR, 68nH
L471	2414017K30	INDCTR, 390nH
M140	0286427Z01	Nut, Antenna
Q21	4815119H01	Transistor
Q22	4815267H01	Transistor
Q51	4815343H01	Transistor
Q70	4815056H01	Transistor
Q100	4815119H01	Transistor
Q150	4815056H01	Transistor
Q170	4809939C34	Transistor
Q171	4815056H01	Transistor
Q280	4815119H01	Transistor
Q311	4815069H02	TP010IT
Q312	4815069H02	TP010IT
Q313	4815066H01	Transistor
Q402	4813973A42	Transistor
Q403	4813973A13	XSTR PNP40V
Q410	4815066H01	Transistor
Q425	4815069H02	TP010IT
Q426	4815069H02	TP010IT
Q427	4815069H02	TP010IT
Q440	4815154H01	Transistor
Q470	4815267H01	Transistor

Circuit Ref	Motorola Part No.	Description
Q471	4815066H01	Transistor
Q472	4815267H01	Transistor
Q481	NOT PLACED	64AM DUMMY PART NUMBER
Q482	NOT PLACED	64AM DUMMY PART NUMBER
Q490	4815066H01	Transistor
Q493	4815069H02	TP010IT
Q494	4815066H01	Transistor
Q520	4815154H01	Transistor
R20	0613952Z52	RES, 6.8K
R21	0613952Q49	RES, 100
R22	0613952Q93	RES, 6800
R23	0613952Z58	RES, 22K
R24	0613952Q70	RES, 750
R25	0613952Q91	RES, 5600
R26	0613952R66	RES, 0
R40	0613952Q73	RES, 1000
R51	0613952Q42	RES, 51
R52	0613952R03	RES, 12K
R53	0613952R13	RES, 33K
R54	0613952Q90	RES, 5100
R55	0613952Q61	RES, 330
R57	0613952Q89	RES, 4700
R60	0613952Q82	RES, 2400
R61	0613952R25	RES, 100K
R62	0613952Q85	RES, 3300
R63	0613952R15	RES, 39K
R64	0613952R08	RES, 20K
R65	0613952R15	RES, 39K
R66	0613952R08	RES, 20K
R67	0613952R08	RES, 20K
R72	0613952Q63	RES, 390
R73	0613952Q79	RES, 1800
R74	0613952Q75	RES, 1200
R75	0613952R03	RES, 12K
R76	0613952Z55	RES, 12K
R77	0613952Z53	RES, 8.2K
R78	0613952Q69	RES, 680
R80	0613952Q90	RES, 5100
R81	0613952Q73	RES, 1000
R82	NOT PLACED	64AM DUMMY PART NUMBER
R90	0613952Q42	RES, 51
R91	0613952Q78	RES, 1600
R100	0613952Q60	RES, 300
R101	0613952Q31	RES, 18
R102	0613952Q60	RES, 300
R103	0613952Q85	RES, 3300
R104	0613952H42	RES, 51
R105	0613952Q75	RES, 1200
R106	0613952Q89	RES, 4700
R107	0613952Q53	RES, 150
R110	0613952Q62	RES, 360
R111	0613952R01	RES, 10K
R120	0613958H53	RES, 150
R121	0613958H53	RES, 150
R150	0680539Z01	RES, 0.1
R151	0613952H33	RES, 22
R152	0613952P01	RES, 100K
R153	0613952P01	RES, 100K
R154	0613952P01	RES, 100K
R155	0613952P01	RES, 100K
R156	0613952Q61	RES, 330
R157	0613952Q91	RES, 5600
R158	0613952Q77	RES, 1500
R162	0613952R01	RES, 10K
R171	0613952Q93	RES, 6800
R202	0613952R29	RES, 150K
R205	0613952Q49	RES, 100
R206	NOT PLACED	64AM DUMMY PART NUMBER
R212	0613958J74	RES, 0
R220	0613952Q53	RES, 150
R221	0613952Q53	RES, 150
R223	0613952Q49	RES, 100
R227	0613952R29	RES, 150K
R230	0613952R26	RES, 110K
R243	0613952Q79	RES, 1800
R244	0613952Q42	RES, 51
R245	0613952Q77	RES, 1500
R246	0613952R25	RES, 100K
R247	0613952R30	RES, 160K
R248	0613952Q42	RES, 51
R253	0613952Q41	RES, 47
R254	0613952Q57	RES, 220
R255	0613952Z46	RES, 3.9K
R261	0613952R14	RES, 36K
R262	0613952Q93	RES, 6800
R263	0613952Q36	RES, 30
R264	0613952Q57	RES, 220
R270	0613952Q31	RES, 18
R271	0613952Q95	RES, 8200
R272	0613952Q96	RES, 9100 2
R273	0613952Q60	RES, 300
R274	0613952Q37	RES, 33
R275	0613952R66	RES, 0
R276	0613952Q73	RES, 1000
R280	0613952Q93	RES, 6800
R281	0613952Q96	RES, 9100 2
R282	0613952Q70	RES, 750
R283	0613952Q55	RES, 180
R284	0613952Q69	RES, 680
R286	0613952R66	RES, 0
R310	0613952R25	RES, 100K
R311	0613952R25	RES, 100K
R312	0613952R08	RES, 20K
R313	0613952Q90	RES, 5100
R320	0613952Z80	RES, 330K
R321	0613952P30	RES, 200K
R322	0613952R25	RES, 100K
R400	NOT PLACED	64AM DUMMY PART NUMBER
R401	0613952R36	RES, 300K
R402	0613952R01	RES, 10K
R403	0613952R01	RES, 10K
R404	0613952R18	RES, 51K
R405	0613952R36	RES, 300K
R406	0613952R33	RES, 220K
R407	0613952R25	RES, 100K
R408	0613952R25	RES, 100K
R409	0613952Q73	RES, 1000
R410	0613952R01	RES, 10K
R411	0613952Q71	RES, 820
R412	0613952R25	RES, 100K
R413	0613952R25	RES, 100K
R414	0613952R13	RES, 33K
R415	0613952R13	RES, 33K
R416	0613952R08	RES, 20K
R417	0613952R01	RES, 10K
R418	0613952R25	RES, 100K
R419	0613952Q89	RES, 4700
R420	0613952P30	RES, 200K
R421	0613952P01	RES, 100K
R422	0613952R25	RES, 100K
R423	0613952R25	RES, 100K
R424	0613952P30	RES, 200K
R425	0613952P01	RES, 100K
R430	0613952R25	RES, 100K
R431	NOT PLACED	64AM DUMMY PART NUMBER
R432	0613952R66	RES, 0
R433	0613952R25	RES, 100K
R434	NOT PLACED	64AM DUMMY PART NUMBER
R440	0613952Q89	RES, 4700
R441	0613952Q89	RES, 4700
R442	0613952H57	RES, 220
R443	0613952H51	CHIP RES 120
R445	0613952Q89	RES, 4700
R446	0613952R01	RES, 10K
R451	0613952R17	RES, 47K
R460	0613952R10	RES, 24K
R462	0613952R10	RES, 24K
R463	0613952R10	RES, 24K
R464	0613952R12	RES, 30K
R469	0613952Q25	RES, 10
R470	0613952Q81	RES, 2200
R471	0613952Q81	RES, 2200
R472	0613952Q69	RES, 680
R473	0613952Q69	RES, 680
R474	0613952H61	RES, 330
R475	0613952R31	RES, 180K
R476	0613952R25	RES, 100K
R477	0613952Q81	RES, 2200
R478	0613952Q81	RES, 2200
R479	0613952R25	RES, 100K
R480	0613952G67	RES, 0
R481	NOT PLACED	64AM DUMMY PART NUMBER
R482	NOT PLACED	64AM DUMMY PART NUMBER
R483	NOT PLACED	64AM DUMMY PART NUMBER
R484	NOT PLACED	64AM DUMMY PART NUMBER
R485	NOT PLACED	64AM DUMMY PART NUMBER
R486	NOT PLACED	64AM DUMMY PART NUMBER
R487	0613952R66	RES, 0
R488	0613952R37	RES, 330K
R489	NOT PLACED	64AM DUMMY PART NUMBER
R490	NOT PLACED	64AM DUMMY PART NUMBER
R491	0613952R66	RES, 0
R492	0613952R10	RES, 24K
R493	0613952R37	RES, 330K
R494	0613952Z80	RES, 330K
R495	0613952Q91	RES, 5600
R496	NOT PLACED	64AM DUMMY PART NUMBER
R497	NOT PLACED	64AM DUMMY PART NUMBER
R498	NOT PLACED	64AM DUMMY PART NUMBER
R499	NOT PLACED	64AM DUMMY PART NUMBER
R501	0613952Q49	RES, 100
R502	0613952Q49	RES, 100
R503	0613952Q49	RES, 100
R504	0613952Q49	RES, 100
R505	0613952Q49	RES, 100

Circuit Ref	Motorola Part No.	Description
R506	0613952Q49	RES, 100
R507	0613952Q49	RES, 100
R508	0613952R25	RES, 100K
R509	0613952R25	RES, 100K
R510	0613952R37	RES, 330K
R511	0613952R25	RES, 100K
R512	0613952R29	RES, 150K
R513	NOT PLACED	64AM DUMMY PART NUMBER
R514	0613952R25	RES, 100K
R515	NOT PLACED	64AM DUMMY PART NUMBER
R516	NOT PLACED	64AM DUMMY PART NUMBER
R517	0613952R66	RES, 0
R518	0613952R33	RES, 220K
R519	0613952R25	RES, 100K
R520	0613952R25	RES, 100K
R521	NOT PLACED	64AM DUMMY PART NUMBER
R522	0613952R25	RES, 100K
R523	0613952R01	RES, 10K
R524	0613952R01	RES, 10K
S440	4080710Z24	Switch
	4080710Z26	Switch
S441	4070354A01	Switch
S442	4070354A01	Switch
S443	4070354A01	Switch
S444	1880619Z04	Potentiometer
SH1	2686421Z02	Shield
SH40	2686419Z02	Shield
SH50	2686423Z02	Shield
SH52	2686424Z02	Shield
SH100	2686418Z02	Shield
SH200	2686424Z02	Shield
SH201	2686423Z02	Shield
SH250	2686425Z02	Shield
SH251	2686425Z02	Shield
SH253	2686422Z02	Shield
SH400	2686420Z03	Shield
SH401	2686420Z03	Shield
T41	2515121H01	Balun Transformer
T42	2515121H01	Balun Transformer
U51	5115281H01	SA616
U52	5115070H01	TC7W04FU
U110	0178034A01	PA Module
U150	5114005A01	LM2904DR
U151	2415954H01	INDCTR Bead
U201	5185177Y01	AT25016
U251	5105750U56	VCO Buffer IC
U310	5115746H01	Voltage Regulator

Circuit Ref	Motorola Part No.	Description
U320	5115679H01	Voltage Regulator
U330	5115745H01	Voltage Regulator
U401	5185143E03	68HC11FLO
U402	5115033H01	EEPROM IC
U403	NOT PLACED	64AM DUMMY PART NUMBER
U404	5115032H01	Flash 128K
U425	5115697H01	OP AMP
U451	5115062H01	IC ASFIC_CMP_R1
U480	NOT PLACED	64AM DUMMY PART NUMBER
U490	9115811H03	Audio Amplifier
U510	5114005A01	LM2904DR
U511	4815066H01	Transistor
VR110	4813977A59	Diode Zener
VR301	4813977M29	Diode 20V
VR302	4813977M29	Diode 20V
VR471	4813977M14	Diode 6.8V
VR472	4813977M05	Diode 3.3V
VR473	4813977M29	Diode 20V
VR474	4813977M29	Diode 20V
VR475	4813977M24	Diode Zener
Y51	4802245J84	XTAL 44.395MHz
Y70	9186145B02	CDBCA455CX36-TC
Y201	4880114R06	Crystal 16.8MHZ
Y202	NOT PLACED	64AM DUMMY PART NUMBER

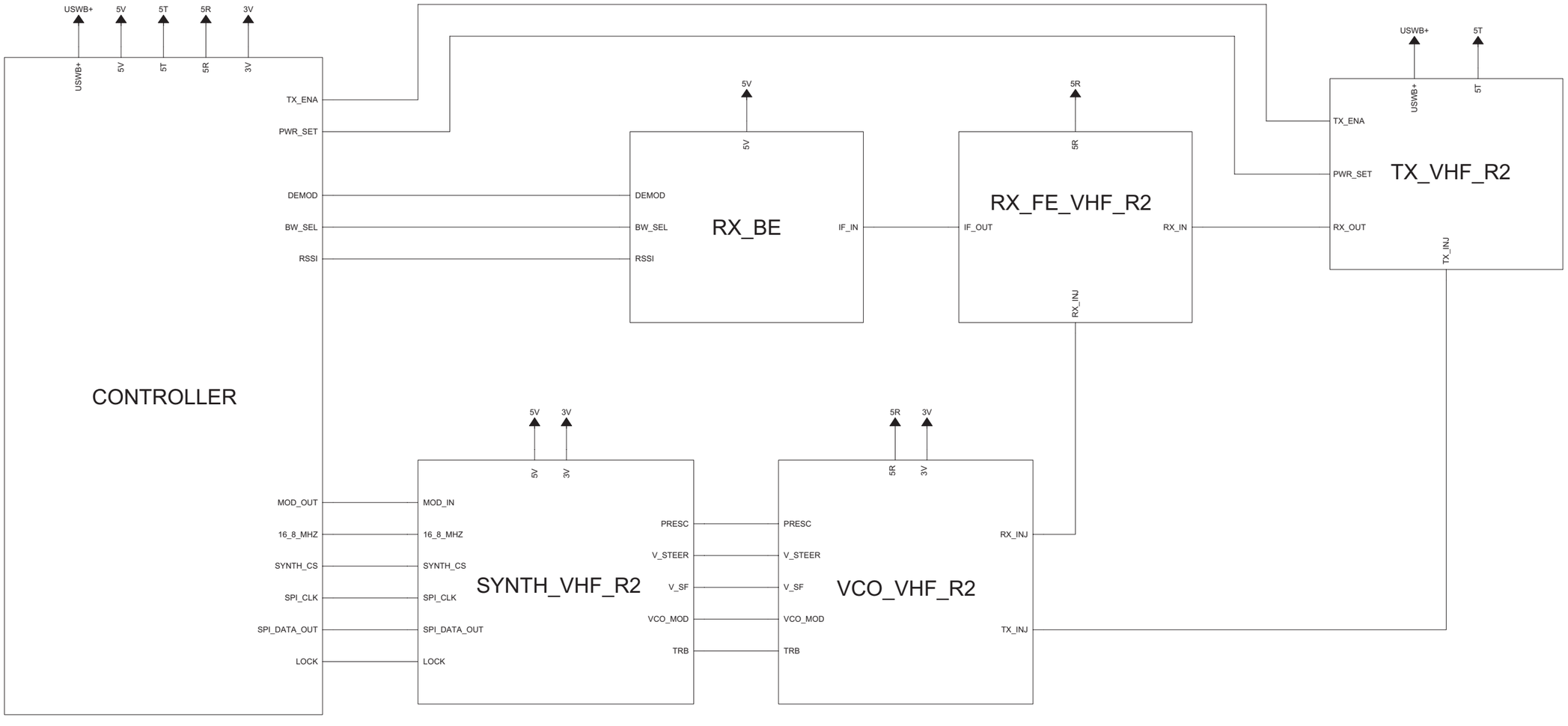


Figure 7-27. VHF (136–162 MHz) Radio Circuit Block Interconnect Diagram (8486769Z06-E)

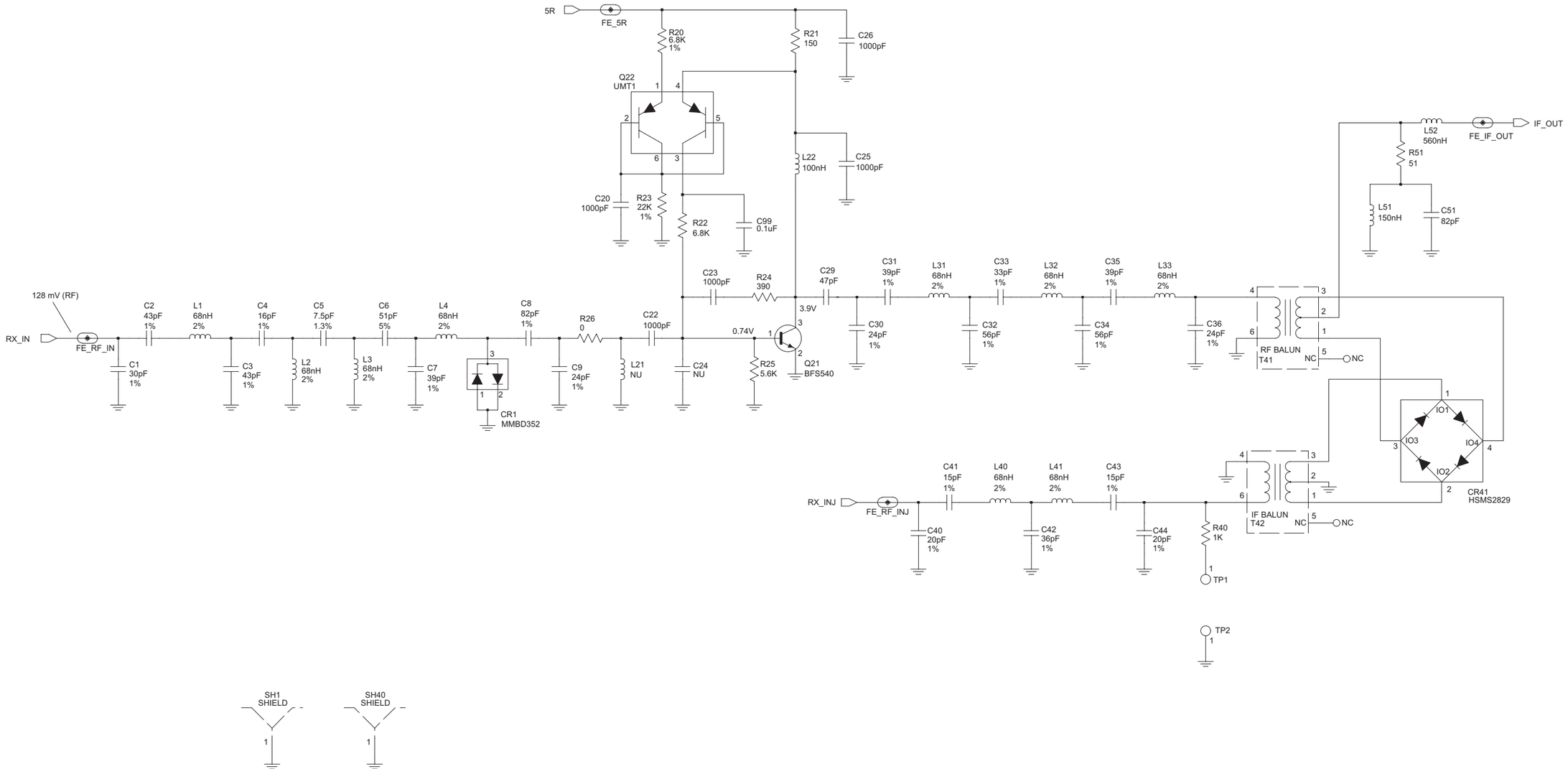


Figure 7-28. VHF (136–162 MHz) Receiver Front End Schematic Diagram (8486769Z06-E)

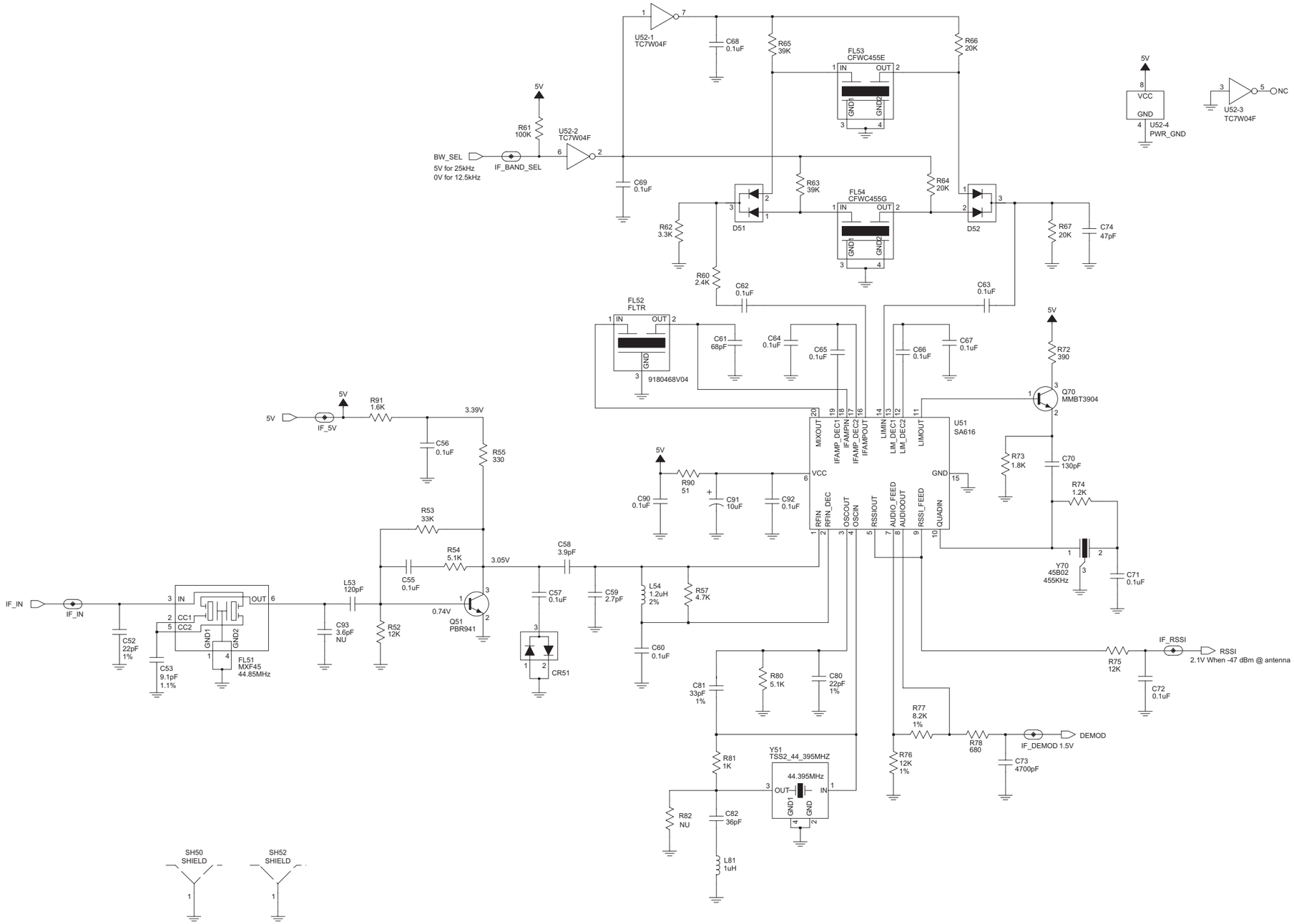
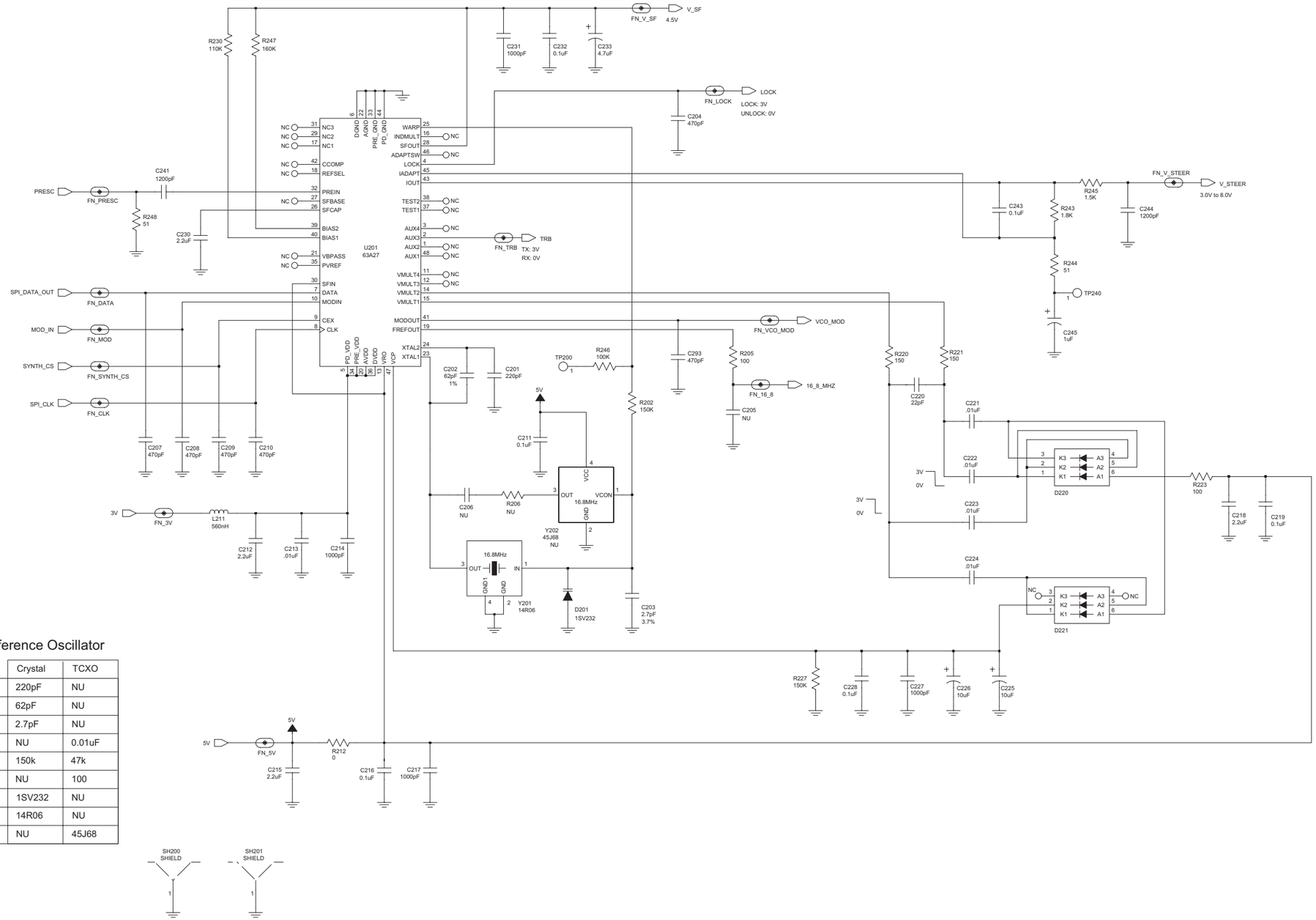


Figure 7-29. VHF (136–162 MHz) Receiver Back End Schematic Diagram (8486769Z06-E)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 7-30. VHF (136–162 MHz) Synthesizer Schematic Diagram (8486769Z06-E)

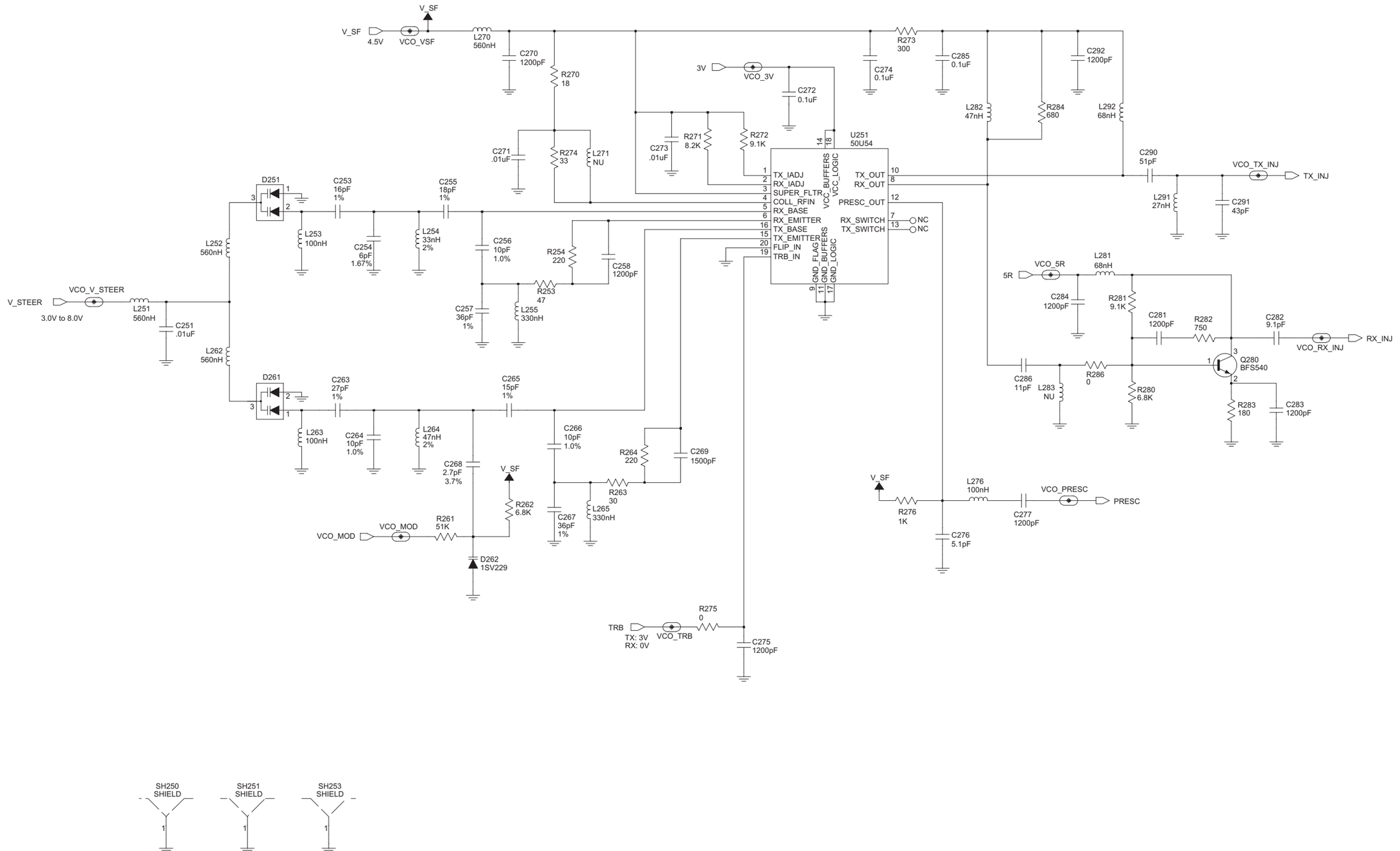


Figure 7-31. VHF (136–162 MHz) Voltage Controlled Oscillator Schematic Diagram (8486769Z06-E)

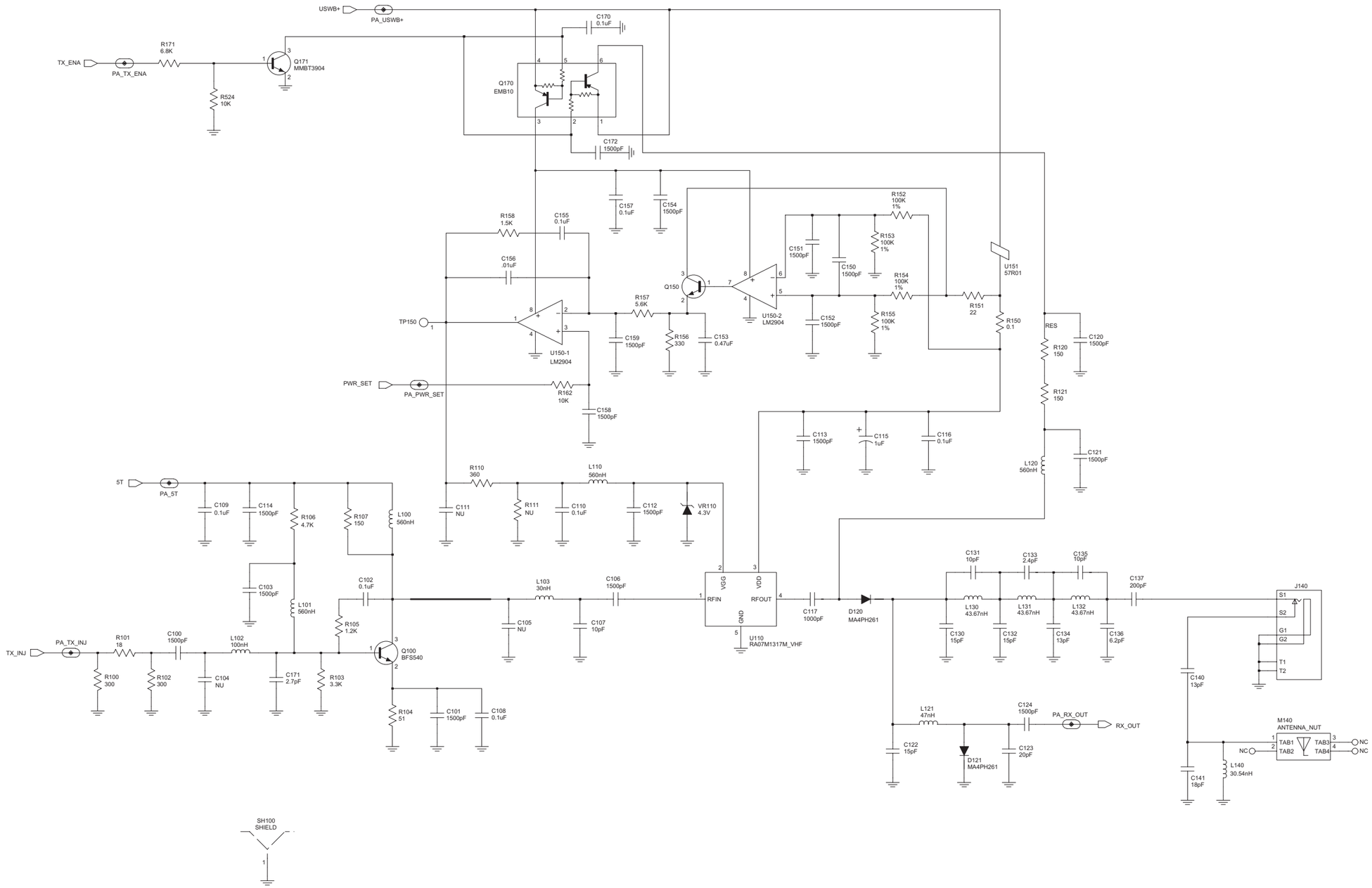


Figure 7-32. VHF (136–162 MHz) Transmitter and Power Control Schematic Diagram (8486769Z06-E)

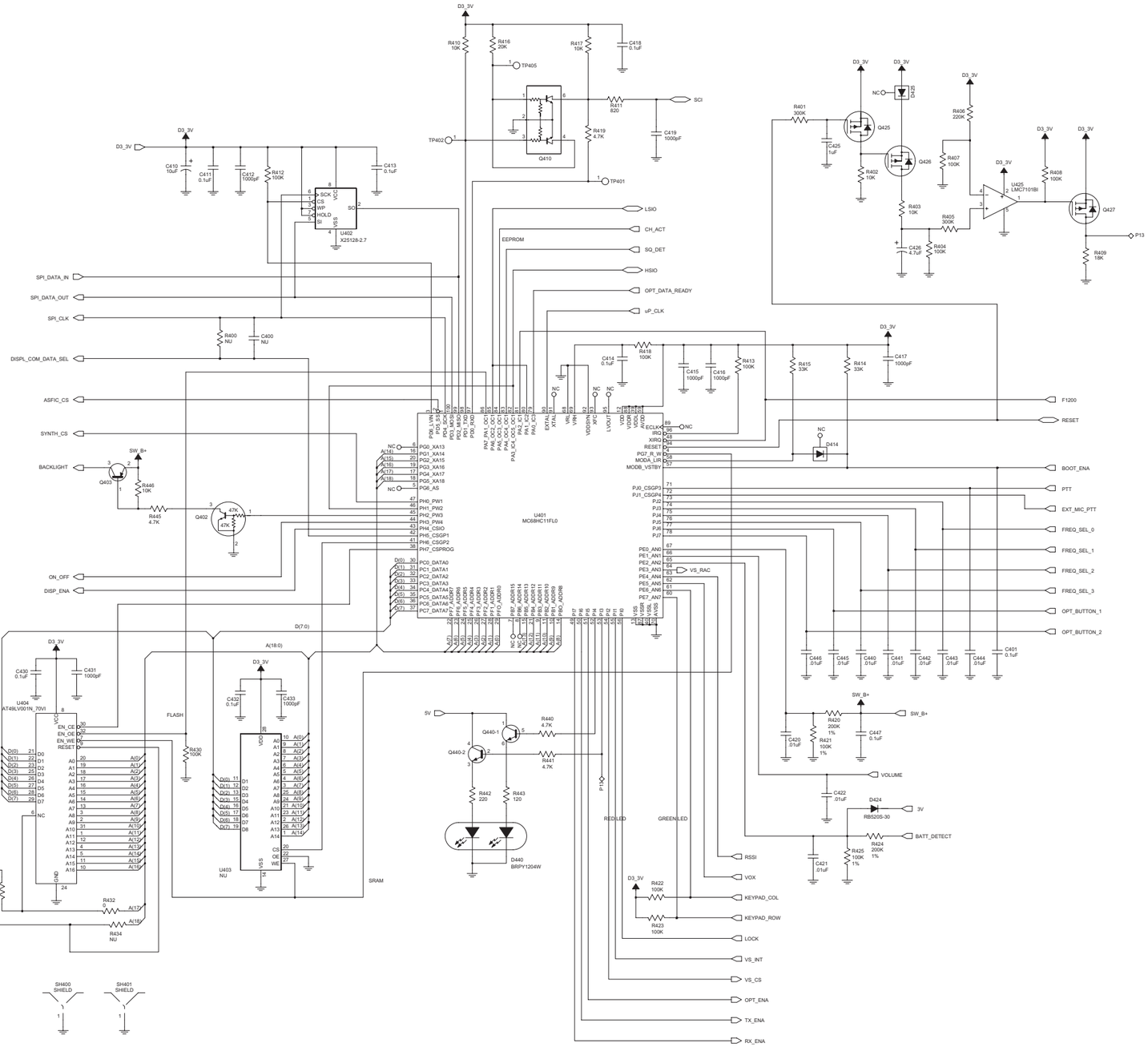


Figure 7-33. VHF (136–162 MHz) Microprocessor Circuitry Schematic Diagram (8486769Z06-E)

	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

Figure 7-34. VHF (136–162 MHz) Audio Circuitry Schematic Diagram (8486769Z06-E)

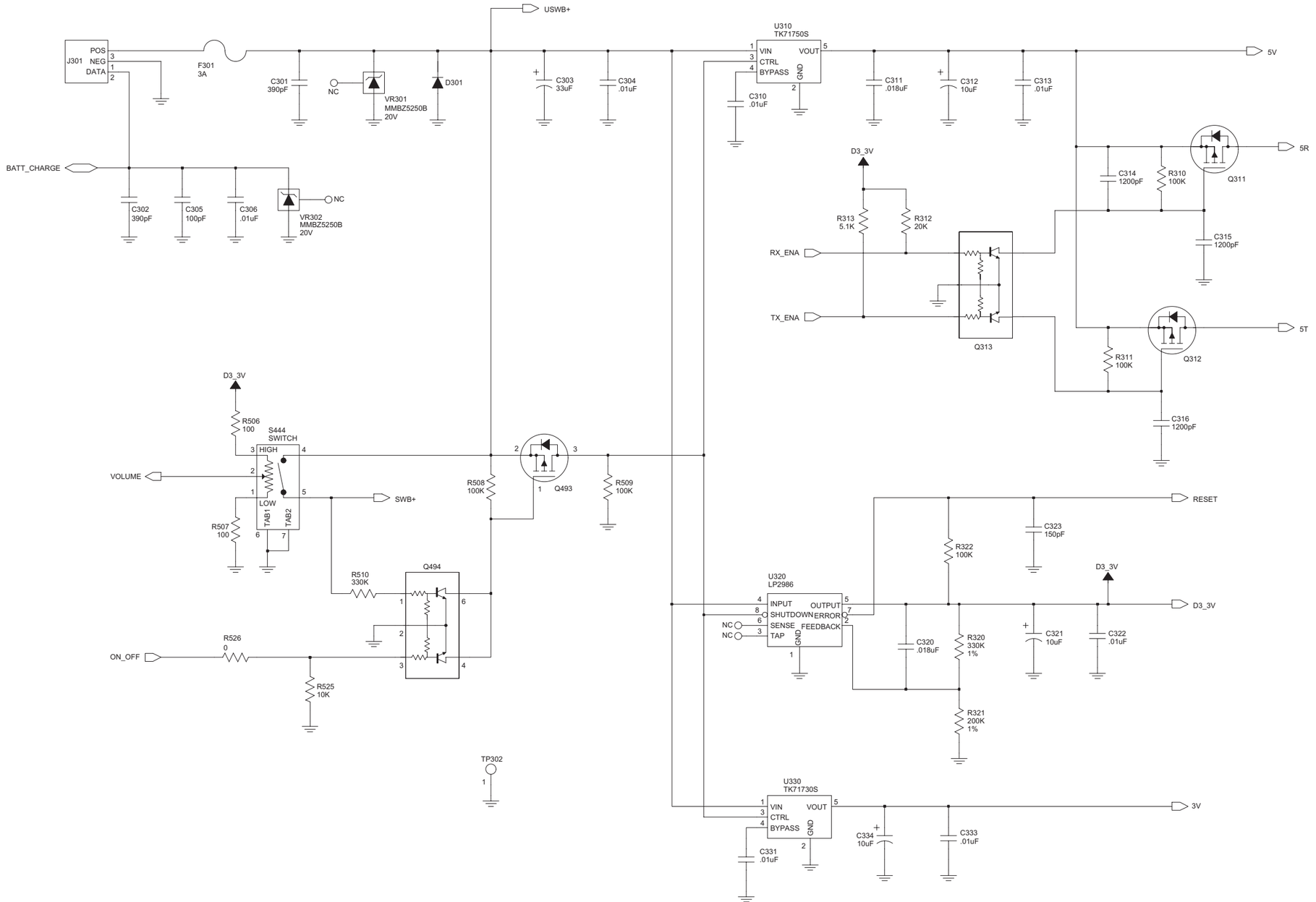


Figure 7-35. VHF (136–162 MHz) DC Regulation Schematic Diagram (8486769Z06-E)

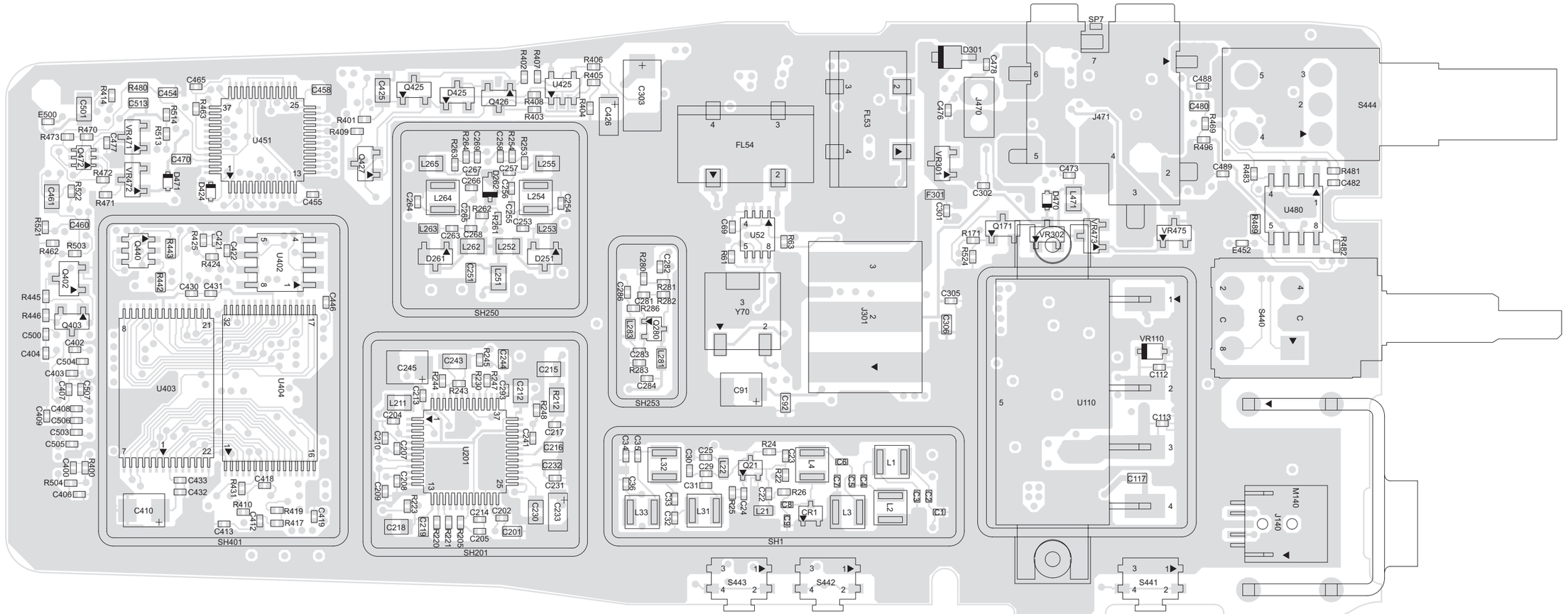


Figure 7-36. VHF (136–162 MHz) Board Component Side View (8486769Z06-E)

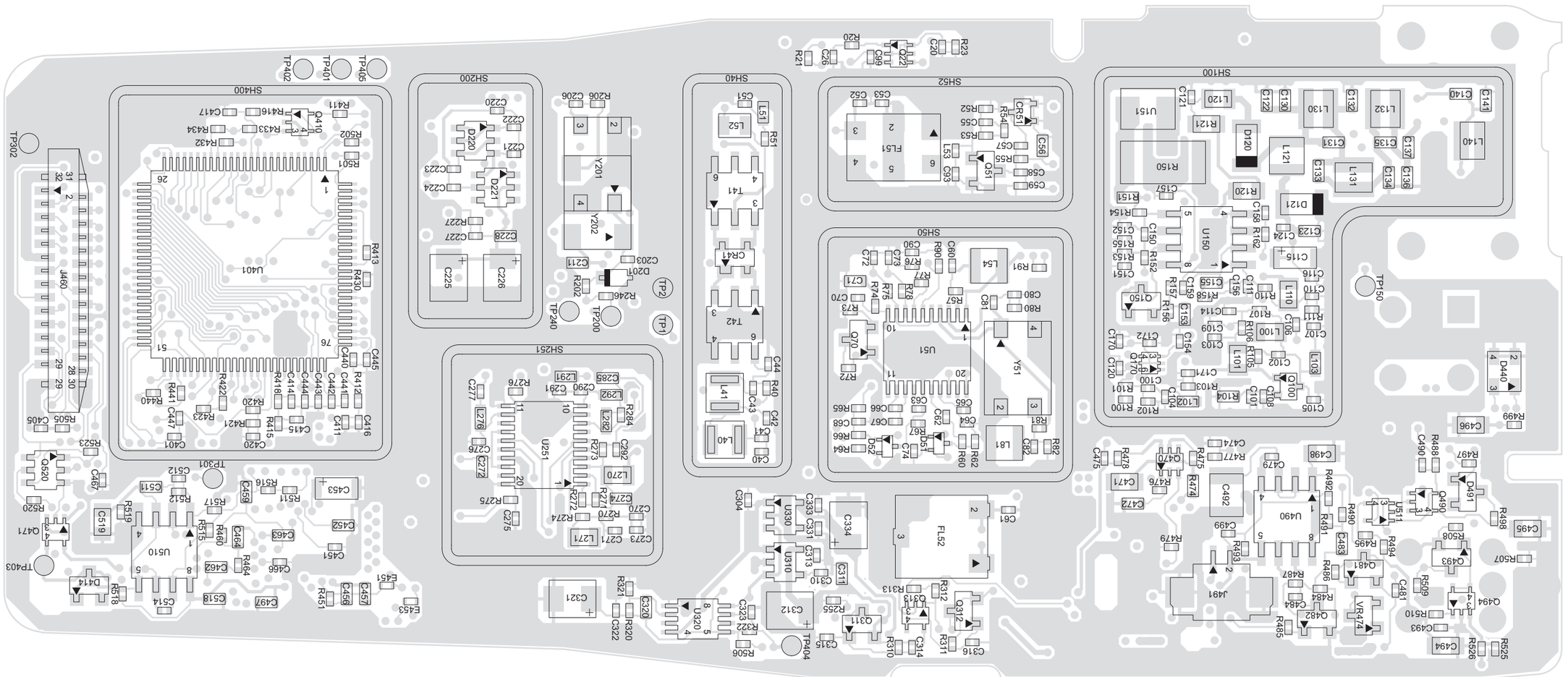


Figure 7-37. VHF (136–162 MHz) Board Solder Side View (8486769Z06-E)

VHF (136–162 MHz) Radio Parts List (8486769Z06-E)

Circuit Ref	Motorola Part No.	Description
C1	2115153H43	CAP, CERAMIC, COG
C2	2115153H48	CAP, CERAMIC, COG
C3	2115153H49	CAP, CERAMIC, COG
C4	2115153H39	CAP, CERAMIC, COG
C5	2115153H15	CAP, CERAMIC, COG
C6	2115153H41	CAP,CERAMIC CHIP,22PF, +1%,-1%,50V-
C7	2115153H45	CAP, CERAMIC, COG
C8	2115153H44	CAP, CERAMIC, COG
C9	NOT PLACED	64AM DUMMY PART NUMBER
C20	2113945A09	CAP CER CHP 1000PF 50V 10%
C22	2113945A09	CAP CER CHP 1000PF 50V 10%
C23	2113945A09	CAP CER CHP 1000PF 50V 10%
C24	NOT PLACED	64AM DUMMY PART NUMBER
C25	2113945A09	CAP CER CHP 1000PF 50V 10%
C26	2113945A09	CAP CER CHP 1000PF 50V 10%
C29	2115153H27	CAP, CERAMIC, COG
C30	2115153H44	CAP, CERAMIC, COG
C31	2115153H46	CAP, CERAMIC, COG
C32	2115153H53	CAP, CERAMIC, COG
C33	2115153H43	CAP, CERAMIC, COG
C34	2115153H53	CAP, CERAMIC, COG
C35	2115153H45	CAP, CERAMIC, COG
C36	2115153H44	CAP, CERAMIC, COG
C40	2115153H40	CAP, CERAMIC, COG
C41	2115153H37	CAP, CERAMIC, COG
C42	2115153H46	CAP, CERAMIC, COG
C43	2115153H37	CAP, CERAMIC, COG
C44	2115153H40	CAP, CERAMIC, COG
C51	2113944A38	CAP CER CHP 82.0PF 50V 5%
C52	2115153H41	CAP,CERAMIC CHIP,22PF, +1%,-1%,50V-
C53	2115153H26	CAP, CERAMIC, COG
C55	2113946K02	CAP CER CHP 0.10UF 16V
C56	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C57	2113946K02	CAP CER CHP 0.10UF 16V
C58	2113944A15	CAP CER CHP 3.9PF 50V +/- 0.25PF
C59	2113944A11	CAP CER CHP 2.7PF 50V +/- 0.25PF
C60	2113946K02	CAP CER CHP 0.10UF 16V
C61	2113944A36	CAP CER CHP 68.0PF 50V 5%
C62	2113946K02	CAP CER CHP 0.10UF 16V
C63	2113946K02	CAP CER CHP 0.10UF 16V
C64	2113946K02	CAP CER CHP 0.10UF 16V
C65	2113946K02	CAP CER CHP 0.10UF 16V
C66	2113946K02	CAP CER CHP 0.10UF 16V
C67	2113946K02	CAP CER CHP 0.10UF 16V
C68	2113946K02	CAP CER CHP 0.10UF 16V
C69	2113946K02	CAP CER CHP 0.10UF 16V
C70	2113944A87	CAP,FXD,130PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,P
C71	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C72	2113946K02	CAP CER CHP 0.10UF 16V
C73	2113945A13	CAP CER CHP 4700PF 50V 10%
C74	2113944A33	CAP CER CHP 47.0PF 50V 5%
C80	2115153H41	CAP,CERAMIC CHIP,22PF, +1%,-1%,50V-
C81	2115153H45	CAP, CERAMIC, COG
C82	2115153H46	CAP, CERAMIC, COG
C90	2113946K02	CAP CER CHP 0.10UF 16V
C91	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C92	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C93	NOT PLACED	64AM DUMMY PART NUMBER
C99	2113946K02	CAP CER CHP 0.10UF 16V
C100	2113945A10	CAP CER CHP 1500PF 50V 10%
C101	2113945A10	CAP CER CHP 1500PF 50V 10%
C102	2113946K02	CAP CER CHP 0.10UF 16V
C103	2113945A10	CAP CER CHP 1500PF 50V 10%
C104	NOT PLACED	64AM DUMMY PART NUMBER
C105	NOT PLACED	64AM DUMMY PART NUMBER
C106	2113945A10	CAP CER CHP 1500PF 50V 10%
C107	2113944A25	CAP CER CHP 10.0PF 50V +/- 0.5PF
C108	2113946K02	CAP CER CHP 0.10UF 16V
C109	2113946K02	CAP CER CHP 0.10UF 16V
C110	2113946K02	CAP CER CHP 0.10UF 16V
C111	NOT PLACED	64AM DUMMY PART NUMBER
C112	2113945A10	CAP CER CHP 1500PF 50V 10%
C113	2113945A10	CAP CER CHP 1500PF 50V 10%
C114	2113945A10	CAP CER CHP 1500PF 50V 10%
C115	2313960B01	CAP,FXD,1UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,87MA,E
C116	2113946K02	CAP CER CHP 0.10UF 16V
C117	2113945L25	CAP,FXD,1000PF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C120	2113945A10	CAP CER CHP 1500PF 50V 10%
C121	2113945A10	CAP CER CHP 1500PF 50V 10%
C122	2113944C32	CAP CER CHP 15.0PF 50V 5%
C123	2113944C80	CAP,FXD,20PF,+5%,-5%, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX,PB
C124	2113945A10	CAP CER CHP 1500PF 50V 10%
C130	2113944C32	CAP CER CHP 15.0PF 50V 5%
C131	2113944C30	CAP CER CHP 10.0PF 50V +/- 0.5PF
C132	2113944C32	CAP CER CHP 15.0PF 50V 5%
C133	2113944C15	CAP CER CHP 2.4PF 50V +/- 0.25PF
C134	2113944C78	CAP,FXD,13PF,+5%,-5%, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX,PB
C135	2113944C30	CAP CER CHP 10.0PF 50V +/- 0.5PF
C136	2113944C72	CAP,FXD,6.2PF,.25PF+/-, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX
C137	2113944C89	CAP,FXD,200PF,+5%,-5%, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX,P
C140	2113944C79	CAP,FXD,16PF,+5%,-5%, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX,PB
C141	2113944C34	CAP CER CHP 22.0PF 50V 5%
C150	2113945A10	CAP CER CHP 1500PF 50V 10%
C151	2113945A10	CAP CER CHP 1500PF 50V 10%
C152	2113945A10	CAP CER CHP 1500PF 50V 10%
C153	2113946L04	CAP CER CHP 0.47UF 16V
C154	2113945A10	CAP CER CHP 1500PF 50V 10%
C155	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C156	2113945B02	CAP CER CHP 10,000PF 25V 10%
C157	2113946K02	CAP CER CHP 0.10UF 16V
C158	2113945A10	CAP CER CHP 1500PF 50V 10%
C159	2113945A10	CAP CER CHP 1500PF 50V 10%
C170	2113946K02	CAP CER CHP 0.10UF 16V
C171	2113944A11	CAP CER CHP 2.7PF 50V +/- 0.25PF
C172	2113945A10	CAP CER CHP 1500PF 50V 10%
C201	2113944C02	CAP CER CHP 220.0PF 50V 5%
C202	2115153H52	CAP, CERAMIC, COG
C203	2115153H13	CAP, CERAMIC, COG
C204	2113945A05	CAP CER CHP 470PF 50V 10%
C205	NOT PLACED	64AM DUMMY PART NUMBER
C206	NOT PLACED	64AM DUMMY PART NUMBER
C207	2113945A05	CAP CER CHP 470PF 50V 10%
C208	2113945A05	CAP CER CHP 470PF 50V 10%
C209	2113945A05	CAP CER CHP 470PF 50V 10%
C210	2113945A05	CAP CER CHP 470PF 50V 10%
C211	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C212	2113946N03	CAP CER CHP 2.2UF 16V
C213	2113945B02	CAP CER CHP 10,000PF 25V 10%

Circuit Ref	Motorola Part No.	Description
C214	2113945A09	CAP CER CHP 1000PF 50V 10%
C215	2113946N03	CAP CER CHP 2.2UF 16V
C216	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C217	2113945A09	CAP CER CHP 1000PF 50V 10%
C218	2113946N03	CAP CER CHP 2.2UF 16V
C219	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C220	2113944A29	CAP CER CHP 22.0PF 50V 5%
C221	2113945B02	CAP CER CHP 10,000PF 25V 10%
C222	2113945B02	CAP CER CHP 10,000PF 25V 10%
C223	2113945B02	CAP CER CHP 10,000PF 25V 10%
C224	2113945B02	CAP CER CHP 10,000PF 25V 10%
C225	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C226	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C227	2113945A09	CAP CER CHP 1000PF 50V 10%
C228	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C230	2113946N03	CAP CER CHP 2.2UF 16V
C231	2113945A09	CAP CER CHP 1000PF 50V 10%
C232	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C233	2313960B30	CAP,FXD,4.7UF,+10%,-10%, 10V-DC,SM,-55DEG CMIN,125DEG CMAX,122MA
C241	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C243	2113945G91	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0805,X7R,-55DEG CMIN,125DEG CMAX
C244	2113945L27	CAP,FXD,1200PF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C245	2313960C26	CAP,FXD,1UF,+10%,-10%, 35V-DC,SM,-55DEG CMIN, 125DEG CMAX,114MA,E
C251	2113945L49	CAP,FXD,.01UF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX,P
C253	2115153H38	CAP, CERAMIC, COG
C254	2115153H30	CAP, CERAMIC, COG
C255	2115153H39	CAP, CERAMIC, COG
C256	2115153H27	CAP, CERAMIC, COG
C257	2115153H46	CAP, CERAMIC, COG
C258	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C263	2115153H43	CAP, CERAMIC, COG
C264	2115153H27	CAP, CERAMIC, COG
C265	2115153H37	CAP, CERAMIC, COG
C266	2115153H27	CAP, CERAMIC, COG
C267	2115153H46	CAP, CERAMIC, COG
C268	2115153H13	CAP, CERAMIC, COG
C269	2113945A10	CAP CER CHP 1500PF 50V 10%
C270	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C271	2113945B02	CAP CER CHP 10,000PF 25V 10%
C272	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C273	2113945B02	CAP CER CHP 10,000PF 25V 10%
C274	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C275	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C276	2113944A18	CAP CER CHP 5.1PF 50V +/- 0.5PF
C277	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C281	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C282	2113944A24	CAP CER CHP 9.1PF 50V +/- 0.5PF
C283	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C284	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C285	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C286	2113944A77	CAP,FXD,11PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C290	2113944A85	CAP,FXD,51PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C291	2115153H48	CAP, CERAMIC, COG
C292	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C293	2113945A05	CAP CER CHP 470PF 50V 10%
C301	2113945A04	CAP CER CHP 390PF 50V 10%
C302	2113945A04	CAP CER CHP 390PF 50V 10%
C303	2313960F04	CAP,FXD,33UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,303MA
C304	2113945B02	CAP CER CHP 10,000PF 25V 10%
C305	2113944A40	CAP CER CHP 100.0PF 50V 5%
C306	2113945L49	CAP,FXD,.01UF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX,P
C310	2113945B02	CAP CER CHP 10,000PF 25V 10%
C311	2113945C21	CAP,FXD,.018UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMA
C312	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C313	2113945B02	CAP CER CHP 10,000PF 25V 10%
C314	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C315	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C316	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C320	2113945C21	CAP,FXD,.018UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMA
C321	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C322	2113945B02	CAP CER CHP 10,000PF 25V 10%
C323	2113944A42	CAP CER CHP 150.0PF 50V 5%
C331	2113945B02	CAP CER CHP 10,000PF 25V 10%
C333	2113945B02	CAP CER CHP 10,000PF 25V 10%
C334	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C400	NOT PLACED	64AM DUMMY PART NUMBER
C401	2113946K02	CAP CER CHP 0.10UF 16V
C402	2113945A09	CAP CER CHP 1000PF 50V 10%
C403	2113944A40	CAP CER CHP 100.0PF 50V 5%
C404	2113945A09	CAP CER CHP 1000PF 50V 10%
C405	2113944A40	CAP CER CHP 100.0PF 50V 5%
C406	2113944A40	CAP CER CHP 100.0PF 50V 5%
C407	2113945A09	CAP CER CHP 1000PF 50V 10%
C408	2113945A09	CAP CER CHP 1000PF 50V 10%
C409	2113945A09	CAP CER CHP 1000PF 50V 10%
C410	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C411	2113946K02	CAP CER CHP 0.10UF 16V
C412	2113945A09	CAP CER CHP 1000PF 50V 10%
C413	2113946K02	CAP CER CHP 0.10UF 16V
C414	2113946K02	CAP CER CHP 0.10UF 16V
C415	2113945A09	CAP CER CHP 1000PF 50V 10%
C416	2113945A09	CAP CER CHP 1000PF 50V 10%
C417	2113945A09	CAP CER CHP 1000PF 50V 10%
C418	2113946K02	CAP CER CHP 0.10UF 16V

Circuit Ref	Motorola Part No.	Description
C419	2113945A09	CAP CER CHP 1000PF 50V 10%
C420	2113945B02	CAP CER CHP 10,000PF 25V 10%
C421	2113945B02	CAP CER CHP 10,000PF 25V 10%
C422	2113945B02	CAP CER CHP 10,000PF 25V 10%
C425	2113946E02	CAP CER CHP 1.0UF 16V 10%
C426	2313960B01	CAP,FXD,1UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,87MA,E
C430	2113946K02	CAP CER CHP 0.10UF 16V
C431	2113945A09	CAP CER CHP 1000PF 50V 10%
C432	2113946K02	CAP CER CHP 0.10UF 16V
C433	2113945A09	CAP CER CHP 1000PF 50V 10%
C440	2113945B02	CAP CER CHP 10,000PF 25V 10%
C441	2113945B02	CAP CER CHP 10,000PF 25V 10%
C442	2113945B02	CAP CER CHP 10,000PF 25V 10%
C443	2113945B02	CAP CER CHP 10,000PF 25V 10%
C444	2113945B02	CAP CER CHP 10,000PF 25V 10%
C445	2113945B02	CAP CER CHP 10,000PF 25V 10%
C446	2113945B02	CAP CER CHP 10,000PF 25V 10%
C447	2113946K02	CAP CER CHP 0.10UF 16V
C451	2113946K02	CAP CER CHP 0.10UF 16V
C452	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C453	2313960B30	CAP,FXD,4.7UF,+10%,-10%, 10V-DC,SM,-55DEG CMIN, 125DEG CMAX,122MA
C454	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C455	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C456	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C457	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C458	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C459	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C460	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C461	2113946F03	CAP CER CHP 4.7UF 6.3V 10%
C462	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C463	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C464	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C465	2113945A09	CAP CER CHP 1000PF 50V 10%
C466	NOT PLACED	64AM DUMMY PART NUMBER
C467	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C470	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C471	2113946N03	CAP CER CHP 2.2UF 16V
C472	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C473	2113944A42	CAP CER CHP 150.0PF 50V 5%
C474	2113944A42	CAP CER CHP 150.0PF 50V 5%
C475	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C476	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C477	2113946K02	CAP CER CHP 0.10UF 16V
C478	2113944A42	CAP CER CHP 150.0PF 50V 5%
C479	2113944A42	CAP CER CHP 150.0PF 50V 5%
C480	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C481	NOT PLACED	64AM DUMMY PART NUMBER
C482	NOT PLACED	64AM DUMMY PART NUMBER
C483	2113946C02	CAP CER CHP 0.22UF 10V 10%
C484	NOT PLACED	64AM DUMMY PART NUMBER
C488	2113945A05	CAP CER CHP 470PF 50V 10%
C489	2113945A05	CAP CER CHP 470PF 50V 10%
C490	2113945A05	CAP CER CHP 470PF 50V 10%
C492	2113955E37	CAP,FXD,10UF,+10%,-10%, 16V-DC,1210,X7R,-55DEG CMIN,125DEG CMAX
C493	2113945A09	CAP CER CHP 1000PF 50V 10%
C494	2113946N03	CAP CER CHP 2.2UF 16V
C495	2113946N02	CAP CER CHP 1.0UF 16V
C496	2113946N02	CAP CER CHP 1.0UF 16V
C497	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C498	2113946N02	CAP CER CHP 1.0UF 16V
C499	2113944A32	CAP CER CHP 39.0PF 50V 5%
C500	2113945A09	CAP CER CHP 1000PF 50V 10%
C501	2113946N02	CAP CER CHP 1.0UF 16V
C503	2113945A09	CAP CER CHP 1000PF 50V 10%
C504	2113945A09	CAP CER CHP 1000PF 50V 10%
C505	2113945A09	CAP CER CHP 1000PF 50V 10%
C506	2113945A09	CAP CER CHP 1000PF 50V 10%
C507	2113945A09	CAP CER CHP 1000PF 50V 10%
C511	2113944C02	CAP CER CHP 220.0PF 50V 5%
C512	2113944A21	CAP CER CHP 6.8PF 50V +/- 0.5PF
C513	2113944C02	CAP CER CHP 220.0PF 50V 5%
C514	2113944A79	CAP,FXD,16PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C518	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C519	2113946N02	CAP CER CHP 1.0UF 16V
CR1	4813974A19	DIODE ARRAY,MXR,SM, SOT-323,7V,.2W,SHTK,2, PB-FREE
CR41	4815923H01	SCHOTTKY DIODE-NEW LEADFREE
CR51	4813974A19	DIODE ARRAY,MXR,SM, SOT-323,7V,.2W,SHTK,2, PB-FREE
D51	4815047H01	BAND SWITCHIND DIODE,ROHM DAN
D52	4815047H01	BAND SWITCHIND DIODE,ROHM DAN
D120	4880973Z02	PIN DIODE
D121	4880973Z02	PIN DIODE
D201	4815072H01	DIODE VARACTOR
D220	4815011H01	DIODE TRIPLE
D221	4815011H01	DIODE TRIPLE
D251	4885094Y01	DIODE VARACTOR ISV228 W18
D261	4885094Y01	DIODE VARACTOR ISV228 W18
D262	4885055Y01	DIODE VARACTOR PB-FREE
D301	4815713H01	DIODE SCHOTTKY 1A 20V PWRMITE
D414	4816064H01	SOT SMBD1022 RH29M19 LH PB-FREE
D424	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D425	4816064H01	SOT SMBD1022 RH29M19 LH PB-FREE
D440	4805729G49	DIODE RED/YEL
D470	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D471	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D491	NOT PLACED	64AM DUMMY PART NUMBER

Circuit Ref	Motorola Part No.	Description
E451	2480640Z01	SURFACE MOUNT FERRITE BEAD
E452	2480640Z01	SURFACE MOUNT FERRITE BEAD
E453	2480640Z01	SURFACE MOUNT FERRITE BEAD
E500	2480640Z01	SURFACE MOUNT FERRITE BEAD
F301	6515076H01	FUSE CHIP SMT TR/1608FF 3A
FL51	9180022M11	XTAL FILTER 44.85MHZ
FL52	9180468V04	SMD455KHZ 4 ELEMENT CER FLTR
FL53	9115811H03	SMD455KHZ 6 ELEMENT
FL54	9115811H01	SMD455KHZ 6 ELEMENT
J140	0986428Z02	CONNECTOR, RF
J301	0986565Z02	CONNECTOR CONTACT BATTERY
J460	0986615Z02	CONN,ZIF,F,28CONT,,TIN,,,CBL
J470	0985818A02	CONNECTOR, MICROPHONE, 2-PIN
J471	0980683Z03	AUDIO JACK (MONO & STEREO)
J491	2815162H01	HEADER SMT HORZ MOUNT LEAD-FREE
L1	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L2	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L3	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L4	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L21	NOT PLACED	64AM DUMMY PART NUMBER
L22	2414017N24	IDCTR,CHIP,100NH,5%,300MA,2OHM,CER,14 Q, 700MHZ SRF,SM,0603,P
L31	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L32	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L33	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L40	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L41	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L51	2414017N26	IDCTR,CHIP,150NH,5%,200MA,2.4OHM,CER,11 Q, 550MHZ SRF,SM,0603
L52	2414032F43	IDCTR,WW,560NH,10%,170MA,3.5OHM,CER,40 Q, 635MHZ SRF,SM,PB-F
L53	2113944A41	CAP CER CHP 120.0PF 50V 5%
L54	2414015A25	IDCTR,FXD,1.2UH,2%,440MA,2OHM,CER,20 Q,200MHZ SRF,SM,1008,PB
L81	2414015A19	IDCTR,FXD,1UH,2%,460MA, 1.75OHM,CER,33 Q,290MHZ SRF,SM,1008,P
L100	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L101	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L102	2415429H36	CHIP INDUCTOR
L103	2415429H25	CHIP INDUCTOR
L110	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L120	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L121	2414032B49	IDCTR,WW,47NH,5%,1A,.16OHM,CER,50 Q,1.35GHZ SRF,SM,PB-FREE
L130	2479990N01	INDUCTOR,AIR WOUND, 43.67NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND (GREEN COLOUR)
L131	2479990N01	INDUCTOR,AIR WOUND, 43.67NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND (GREEN COLOUR)
L132	2479990N01	INDUCTOR,AIR WOUND, 43.67NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND (GREEN COLOUR)
L140	2479990M01	INDUCTOR,AIR WOUND, 30.54NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND (GREEN COLOUR)
L211	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L251	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L252	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L253	2415429H36	CHIP INDUCTOR
L254	2414015C05	IDCTR,FXD,33NH,2%,1.3MA, .09OHM,CER,75 Q,1.7GHZ SRF,SM,1008,P
L255	2414017K29	IDCTR,CHIP,330NH,5%,150MA,1.5OHM,CER,11 Q, 250MHZ SRF,SM,0805
L262	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L263	2415429H36	CHIP INDUCTOR
L264	2414015C07	IDCTR,FXD,47NH,2%,1.2MA, .12OHM,CER,75 Q,1.45GHZ SRF,SM,1008
L265	2414017K29	IDCTR,CHIP,330NH,5%,150MA,1.5OHM,CER,11 Q, 250MHZ SRF,SM,0805
L270	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L271	NOT PLACED	64AM DUMMY PART NUMBER
L276	2414017N24	IDCTR,CHIP,100NH,5%,300MA,2OHM,CER,14 Q, 700MHZ SRF,SM,0603,P
L281	2414017N22	IDCTR,CHIP,68NH,5%,400MA,1.2OHM,CER,14 Q, 800MHZ SRF,SM,0603
L282	2414017N20	IDCTR,CHIP,47NH,5%,500MA,.86OHM,CER,14 Q, 900MHZ SRF,SM,0603
L283	NOT PLACED	64AM DUMMY PART NUMBER
L291	2414017N17	IDCTR,CHIP,27NH,5%,600MA,.62OHM,CER,12 Q,1.2GHZ SRF,SM,0603
L292	2414017N22	IDCTR,CHIP,68NH,5%,400MA,1.2OHM,CER,14 Q, 800MHZ SRF,SM,0603
L471	2414017K30	IDCTR,CHIP,390NH,5%,150MA,1.8OHM,CER,11Q,200MHZSRF,SM,0805,P
M140	0286427Z02	NUT, ANTENNA
PASTE	1085674C03	PASTE/NC-SMQ230
Q21	4802245J95	BJT, NPN TRANSISTOR
Q22	4815267H01	DBRT UMT1NFTN
Q51	4802197J95	RF TRANSISTOR PBR941
Q70	4813973M07	XSTR,BIP GP SS,NPN, T3904,SM,SOT-23,SMT,40V, .225W,200MA,300MHZ
Q100	4802245J95	BJT, NPN TRANSISTOR
Q150	4813973M07	XSTR,BIP GP SS,NPN, T3904,SM,SOT-23,SMT,40V, .225W,200MA,300MHZ
Q170	4809939C34	TSTR DUAL PNP EMB10T2R EMT6
Q171	4813973M07	XSTR,BIP GP SS,NPN, T3904,SM,SOT-23,SMT,40V, .225W,200MA,300MHZ
Q280	4802245J95	BJT, NPN TRANSISTOR
Q311	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q312	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q313	4815066H01	UMG5N DIGITAL TRANSISTOR
Q402	4813973A42	XSTR,BIP GP SS,NPN,SM, SC-59,SMT,50V,.23W,100MA, PB-FREE
Q403	4813973A13	XSTR,GEN PURPOSE SMALL SIG,PNP, MMBT3906L,TO-236,4, PB-FREE
Q410	4815066H01	UMG5N DIGITAL TRANSISTOR
Q425	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q426	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q427	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q440	4815154H01	DUAL TRANS NPN

Circuit Ref	Motorola Part No.	Description
Q470	4815267H01	DBRT UMT1NFTN
Q471	4815066H01	UMG5N DIGITAL TRANSISTOR
Q472	4815267H01	DBRT UMT1NFTN
Q481	NOT PLACED	64AM DUMMY PART NUMBER
Q482	NOT PLACED	64AM DUMMY PART NUMBER
Q490	4815066H01	UMG5N DIGITAL TRANSISTOR
Q493	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q494	4815066H01	UMG5N DIGITAL TRANSISTOR
Q520	4815154H01	DUAL TRANS NPN
R20	0613952Z52	RES,MF,6.8KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R21	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R22	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R23	0613952Z58	RES,MF,22KOHM,1%,.0625 W, SM,0402,200PPM/CEL, PB-FREE
R24	0613952Q70	CER CHIP RES 750 OHM 5% 0402
R25	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R26	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R40	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R51	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R52	0613952R03	CER CHIP RES 12K OHM 5% 0402
R53	0613952R13	CER CHIP RES 33K OHM 5% 0402
R54	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R55	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R57	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R60	0613952Q82	CER CHIP RES 2400 OHM 5% 0402
R61	0613952R25	CER CHIP RES 100K OHM 5% 0402
R62	0613952Q85	CER CHIP RES 3300 OHM 5% 0402
R63	0613952R15	CER CHIP RES 39K OHM 5% 0402
R64	0613952R08	CER CHIP RES 20K OHM 5% 0402
R65	0613952R15	CER CHIP RES 39K OHM 5% 0402
R66	0613952R08	CER CHIP RES 20K OHM 5% 0402
R67	0613952R08	CER CHIP RES 20K OHM 5% 0402
R72	0613952Q63	CER CHIP RES 390 OHM 5% 0402
R73	0613952Q79	CER CHIP RES 1800 OHM 5% 0402
R74	0613952Q75	CER CHIP RES 1200 OHM 5% 0402
R75	0613952R03	CER CHIP RES 12K OHM 5% 0402
R76	0613952Z55	RES,MF,12KOHM,1%,.0625 W, SM,0402,200PPM/CEL, PB-FREE
R77	0613952Z53	RES,MF,8.2KOHM,1%,.0625 W, SM,0402,200PPM/CEL, PB-FREE
R78	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R80	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R81	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R82	NOT PLACED	64AM DUMMY PART NUMBER
R90	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R91	0613952Q78	CER CHIP RES 1600 OHM 5% 0402
R100	0613952Q60	CER CHIP RES 300 OHM 5% 0402
R101	0613952Q31	CER CHIP RES 18.0 OHM 5% 0402
R102	0613952Q60	CER CHIP RES 300 OHM 5% 0402
R103	0613952Q85	CER CHIP RES 3300 OHM 5% 0402
R104	0613952H42	CER CHIP RES 51.0 OHM 5% 0603
R105	0613952Q75	CER CHIP RES 1200 OHM 5% 0402
R106	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R107	0613952Q53	CER CHIP RES 150 OHM 5% 0402
R110	0613952Q62	CER CHIP RES 360 OHM 5% 0402
R111	0613952R01	CER CHIP RES 10K OHM 5% 0402
R120	0613958H53	CER CHIP RES 150 OHM 5% 0805
R121	0613958H53	CER CHIP RES 150 OHM 5% 0805
R150	0615043C01	RES POWER METAL STRIP W18 COMPLIANT
R151	0613952H33	CER CHIP RES 22.0 OHM 5% 0603
R152	0613952P01	CER CHIP RES 100K OHM 1% 0402
R153	0613952P01	CER CHIP RES 100K OHM 1% 0402
R154	0613952P01	CER CHIP RES 100K OHM 1% 0402
R155	0613952P01	CER CHIP RES 100K OHM 1% 0402
R156	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R157	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R158	0613952Q77	CER CHIP RES 1500 OHM 5% 0402
R162	0613952R01	CER CHIP RES 10K OHM 5% 0402
R171	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R202	0613952R29	CER CHIP RES 150K OHM 5% 0402
R205	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R206	NOT PLACED	64AM DUMMY PART NUMBER
R212	0613958J74	CER CHIP RES 0.0 OHM JMP 0805
R220	0613952Q53	CER CHIP RES 150 OHM 5% 0402
R221	0613952Q53	CER CHIP RES 150 OHM 5% 0402
R223	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R227	0613952R29	CER CHIP RES 150K OHM 5% 0402
R230	0613952R26	CER CHIP RES 110K OHM 5% 0402
R243	0613952Q79	CER CHIP RES 1800 OHM 5% 0402
R244	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R245	0613952Q77	CER CHIP RES 1500 OHM 5% 0402
R246	0613952R25	CER CHIP RES 100K OHM 5% 0402
R247	0613952R30	CER CHIP RES 160K OHM 5% 0402
R248	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R253	0613952Q41	CER CHIP RES 47.0 OHM 5% 0402
R254	0613952Q57	CER CHIP RES 220 OHM 5% 0402
R255	0613952Z46	RES,MF,3.9KOHM,1%,.0625 W, SM,0402,200PPM/CEL, PB-FREE
R261	0613952R14	CER CHIP RES 36K OHM 5% 0402
R262	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R263	0613952Q36	CER CHIP RES 30.0 OHM 5% 0402
R264	0613952Q57	CER CHIP RES 220 OHM 5% 0402
R270	0613952Q31	CER CHIP RES 18.0 OHM 5% 0402
R271	0613952Q95	CER CHIP RES 8200 OHM 5% 0402
R272	0613952Q96	CER CHIP RES 9100 OHM 5% 0402
R273	0613952Q60	CER CHIP RES 300 OHM 5% 0402
R274	0613952Q37	CER CHIP RES 33.0 OHM 5% 0402
R275	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R276	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R280	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R281	0613952Q96	CER CHIP RES 9100 OHM 5% 0402
R282	0613952Q70	CER CHIP RES 750 OHM 5% 0402
R283	0613952Q55	CER CHIP RES 180 OHM 5% 0402
R284	0613952Q69	CER CHIP RES 680 OHM 5% 0402

Circuit Ref	Motorola Part No.	Description
R286	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R310	0613952R25	CER CHIP RES 100K OHM 5% 0402
R311	0613952R25	CER CHIP RES 100K OHM 5% 0402
R312	0613952R08	CER CHIP RES 20K OHM 5% 0402
R313	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R320	0613952Z80	RES,MF,330KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R321	0613952P30	CER CHIP RES 200K OHM 1% 0402
R322	0613952R25	CER CHIP RES 100K OHM 5% 0402
R400	NOT PLACED	64AM DUMMY PART NUMBER
R401	0613952R36	CER CHIP RES 300K OHM 5% 0402
R402	0613952R01	CER CHIP RES 10K OHM 5% 0402
R403	0613952R01	CER CHIP RES 10K OHM 5% 0402
R404	0613952R18	CER CHIP RES 51K OHM 5% 0402
R405	0613952R36	CER CHIP RES 300K OHM 5% 0402
R406	0613952R33	CER CHIP RES 220K OHM 5% 0402
R407	0613952R25	CER CHIP RES 100K OHM 5% 0402
R408	0613952R25	CER CHIP RES 100K OHM 5% 0402
R409	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R410	0613952R01	CER CHIP RES 10K OHM 5% 0402
R411	0613952Q71	CER CHIP RES 820 OHM 5% 0402
R412	0613952R25	CER CHIP RES 100K OHM 5% 0402
R413	0613952R25	CER CHIP RES 100K OHM 5% 0402
R414	0613952R13	CER CHIP RES 33K OHM 5% 0402
R415	0613952R13	CER CHIP RES 33K OHM 5% 0402
R416	0613952R08	CER CHIP RES 20K OHM 5% 0402
R417	0613952R01	CER CHIP RES 10K OHM 5% 0402
R418	0613952R25	CER CHIP RES 100K OHM 5% 0402
R419	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R420	0613952P30	CER CHIP RES 200K OHM 1% 0402
R421	0613952P01	CER CHIP RES 100K OHM 1% 0402
R422	0613952R25	CER CHIP RES 100K OHM 5% 0402
R423	0613952R25	CER CHIP RES 100K OHM 5% 0402
R424	0613952P30	CER CHIP RES 200K OHM 1% 0402
R425	0613952P01	CER CHIP RES 100K OHM 1% 0402
R430	0613952R25	CER CHIP RES 100K OHM 5% 0402
R431	NOT PLACED	64AM DUMMY PART NUMBER
R432	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R433	0613952R25	CER CHIP RES 100K OHM 5% 0402
R434	NOT PLACED	64AM DUMMY PART NUMBER
R440	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R441	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R442	0613952H57	CER CHIP RES 220 OHM 5% 0603
R443	0613952H51	CER CHIP RES 120 OHM 5% 0603
R445	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R446	0613952R01	CER CHIP RES 10K OHM 5% 0402
R451	0613952R17	CER CHIP RES 47K OHM 5% 0402
R460	0613952R10	CER CHIP RES 24K OHM 5% 0402
R462	0613952R10	CER CHIP RES 24K OHM 5% 0402
R463	0613952R10	CER CHIP RES 24K OHM 5% 0402
R464	0613952R12	CER CHIP RES 30K OHM 5% 0402
R469	0613952Q25	CER CHIP RES 10.0 OHM 5% 0402
R470	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R471	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R472	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R473	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R474	0613952H61	CER CHIP RES 330 OHM 5% 0603
R475	0613952R31	CER CHIP RES 180K OHM 5% 0402
R476	0613952R25	CER CHIP RES 100K OHM 5% 0402
R477	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R478	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R479	0613952R25	CER CHIP RES 100K OHM 5% 0402
R480	0613952G67	CER CHIP RES 0.0 +/-0.050 OHM
R481	NOT PLACED	64AM DUMMY PART NUMBER
R482	NOT PLACED	64AM DUMMY PART NUMBER
R483	NOT PLACED	64AM DUMMY PART NUMBER
R484	NOT PLACED	64AM DUMMY PART NUMBER
R485	NOT PLACED	64AM DUMMY PART NUMBER
R486	NOT PLACED	64AM DUMMY PART NUMBER
R487	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R488	0613952R37	CER CHIP RES 330K OHM 5% 0402
R489	NOT PLACED	64AM DUMMY PART NUMBER
R490	NOT PLACED	64AM DUMMY PART NUMBER
R491	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R492	0613952R10	CER CHIP RES 24K OHM 5% 0402
R493	0613952R37	CER CHIP RES 330K OHM 5% 0402
R494	0613952Z80	RES,MF,330KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R495	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R496	NOT PLACED	64AM DUMMY PART NUMBER
R497	NOT PLACED	64AM DUMMY PART NUMBER
R498	NOT PLACED	64AM DUMMY PART NUMBER
R499	NOT PLACED	64AM DUMMY PART NUMBER
R501	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R502	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R503	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R504	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R505	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R506	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R507	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R508	0613952R25	CER CHIP RES 100K OHM 5% 0402
R509	0613952R25	CER CHIP RES 100K OHM 5% 0402
R510	0613952R37	CER CHIP RES 330K OHM 5% 0402
R511	0613952R25	CER CHIP RES 100K OHM 5% 0402
R512	0613952R29	CER CHIP RES 150K OHM 5% 0402
R513	NOT PLACED	64AM DUMMY PART NUMBER
R514	0613952R25	CER CHIP RES 100K OHM 5% 0402
R515	NOT PLACED	64AM DUMMY PART NUMBER
R516	NOT PLACED	64AM DUMMY PART NUMBER
R517	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R518	0613952R33	CER CHIP RES 220K OHM 5% 0402
R519	0613952R25	CER CHIP RES 100K OHM 5% 0402

Circuit Ref	Motorola Part No.	Description
R520	0613952R25	CER CHIP RES 100K OHM 5% 0402
R521	NOT PLACED	64AM DUMMY PART NUMBER
R522	0613952R25	CER CHIP RES 100K OHM 5% 0402
R523	0613952R01	CER CHIP RES 10K OHM 5% 0402
R524	0613952R01	CER CHIP RES 10K OHM 5% 0402
R525	0613952R01	CER CHIP RES 10K OHM 5% 0402
R526	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
S440	4080710Z26	SWITCH, FREQUENCY (EPP)
S441	4070354A01	LIGHT TOUCH SWITCH-SMD
S442	4070354A01	LIGHT TOUCH SWITCH-SMD
S443	4070354A01	LIGHT TOUCH SWITCH-SMD
S444	1880619Z06	POTENTIOMETER, VOLUME
SH1	2686421Z02	SHIELD, FE, ELP
SH40	2686419Z02	SHIELD, MIXER, ELP
SH50	2686423Z02	SHIELD, 19 X 19 X 3.03 MM
SH52	2686424Z02	SHIELD, IF, ELP
SH100	2686418Z03	SHEILD, HARMONIC FILTER, ELP
SH200	2686424Z02	SHIELD, IF, ELP
SH201	2686423Z02	SHIELD, 19 X 19 X 3.03 MM
SH250	2686425Z02	SHIELD
SH251	2686425Z02	SHIELD
SH253	2686422Z02	SHIELD, BUFFER, ELP
SH400	2686420Z04	SHIELD, CONTROL, ELP
SH401	2686420Z03	SHIELD,CONTROL,ELP
SP7	1088791Y02	SOLDER PELLETS, LEAD FREE
T41	2515121H01	BALUN, TRANSFORMER W18 COMP
T42	2515121H01	BALUN, TRANSFORMER W18 COMP
U51	5115281H01	FM IF IC SA616 FROM PHILIPS
U52	5115070H01	IC 3-INV LMOS TC7W04FU
U110	0186438Z04	ASSY,AMP
U150	5114005A01	IC,OP AMP,2PER PKG,GP, SM,SO-8,PB-FREE
U151	2415954H02	INDUCTOR BEAD CHIP EPP WITH EPOXY

Circuit Ref	Motorola Part No.	Description
U201	5185177Y01	IC TESTED AT25016 48 PIN W18
U251	5171121L01	CUSTOM LOW VOLTAGE VCO BUFFER IC
U310	5115746H01	VOLTAGE REGULATOR, 5V
U320	5115679H01	IC VOLTAGE REGLTR LP2986
U330	5115745H01	VOLTAGE REGULATOR, 3V
U401	5185143E03	HC11FL0 (3V) ASIC MICRO-P
U402	5116648H01	128KBIT SERIAL SPI BUS EEPROM
U403	NOT PLACED	64AM DUMMY PART NUMBER
U404	51012084002	IC FLASH 4MBIT 3.3V 8MM14MM
U425	5115697H01	LOW PWR OP AMP W/RAIL TO RAIL
U451	5115062H01	IC ASFIC_CMP
U480	NOT PLACED	64AM DUMMY PART NUMBER
U490	5116029H01	1 W BTL AUDIO AMPLIFIER
U510	5114005A01	IC,OP AMP,2PER PKG,GP, SM,SO-8,PB-FREE
U511	4815066H01	UMG5N DIGITAL TRANSISTOR
VR110	4813977A59	DIODE,ZEN,MM3Z3V9,SM, SOD-323,3.9V,10MA,.2W, ZEN,PB-FREE
VR301	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR302	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR471	4813977M14	DIODE,ZEN,MBZ5235,SM, SOT-23,6.8V,10MA,.225W, ZEN,PB-FREE
VR472	4813977M05	DIODE,ZEN,MBZ5226,SM, SOT-23,3.3V,10MA,.225W, ZEN,PB-FREE
VR473	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR474	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR475	4813977M24	DIODE,ZEN,MBZ5245,SM, SOT-23,15V,10MA,.225W, ZEN,PB-FREE
Y51	4802245J84	XTAL 44.395MHZ, 3RD OT, SMD
Y70	9186145B02	CER.DISCR. CDBCA455CX36-TC

Circuit Ref	Motorola Part No.	Description
Y201	4880114R08	CRYSTAL, QUARTZ 16.8 MHZ
Y202	NOT PLACED	64AM DUMMY PART NUMBER

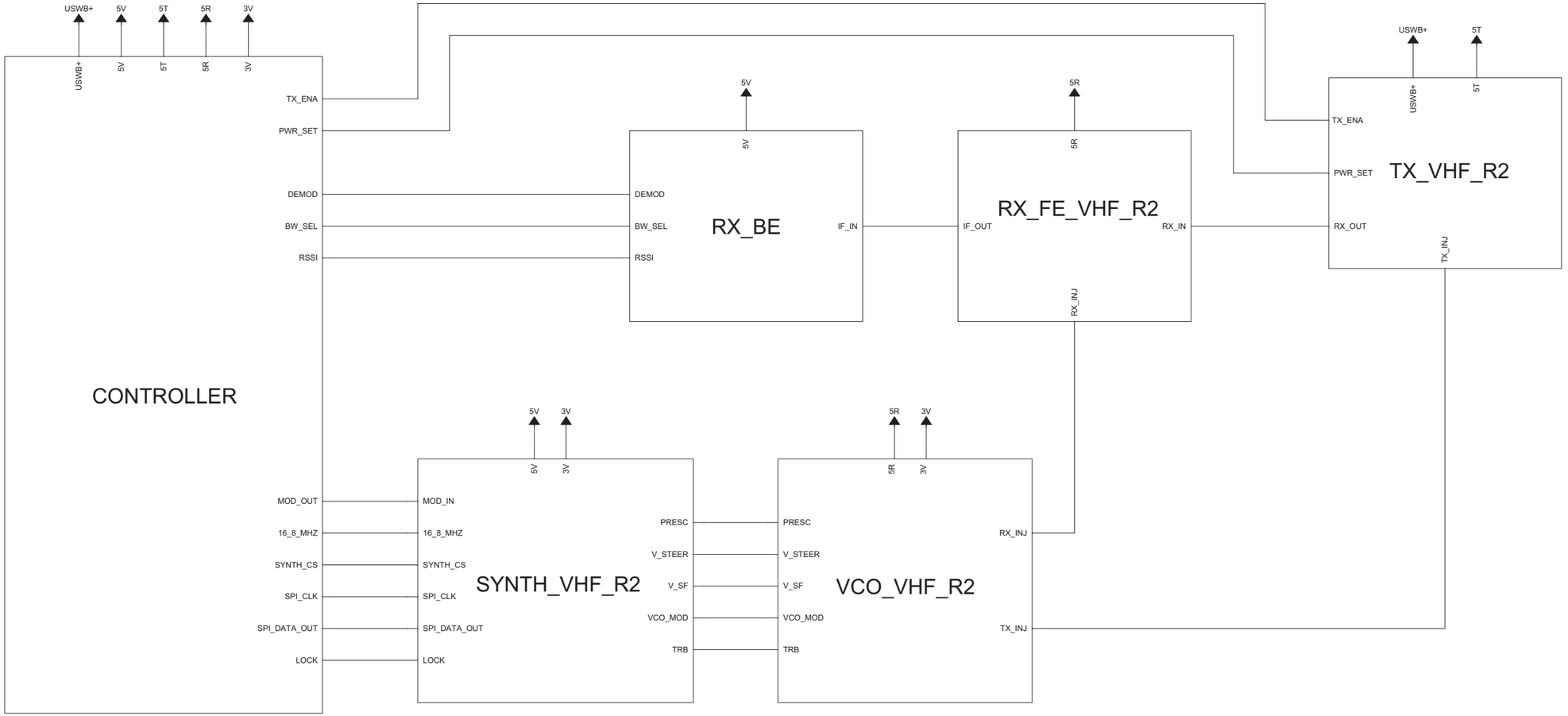


Figure 7-38. VHF (136–162 MHz) Radio Circuit Block Interconnect Diagram (8486769Z08-G)

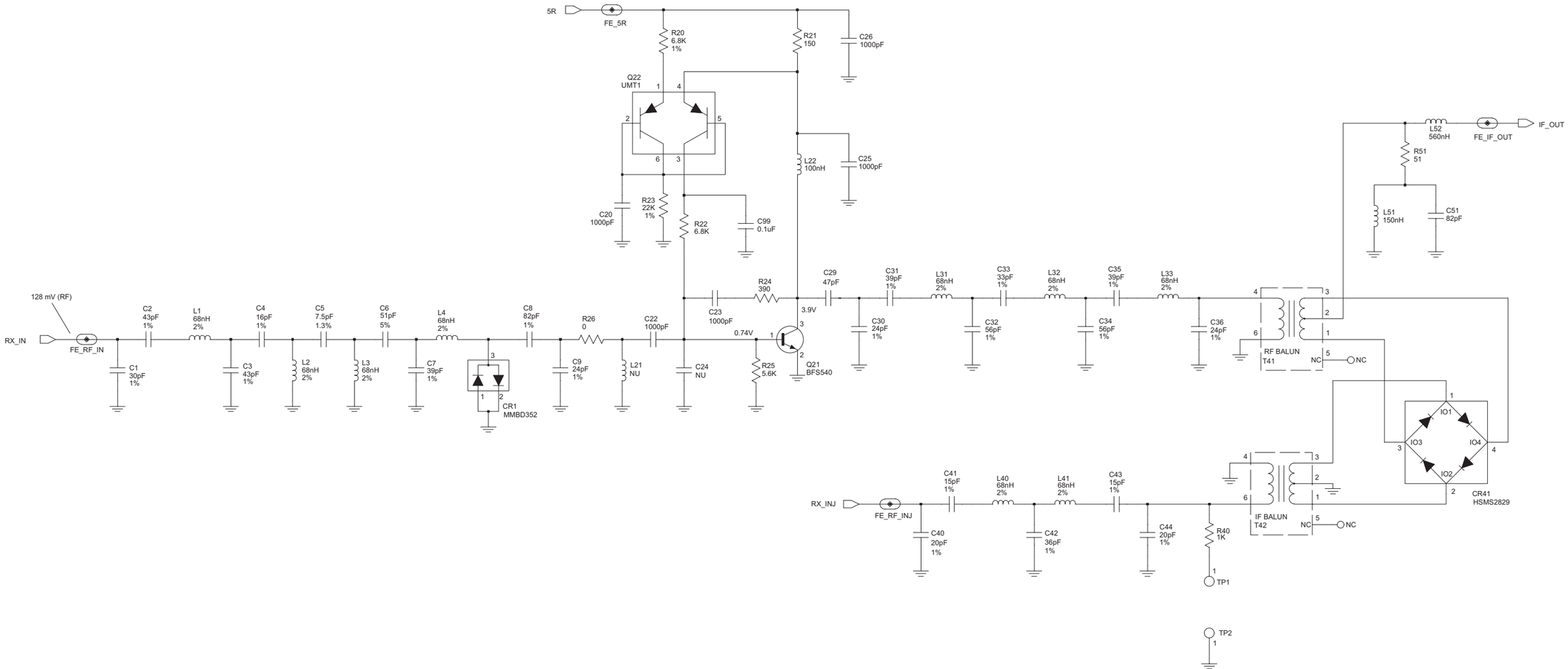


Figure 7-39. VHF (136–162 MHz) Receiver Front End Schematic Diagram (8486769Z08-G)

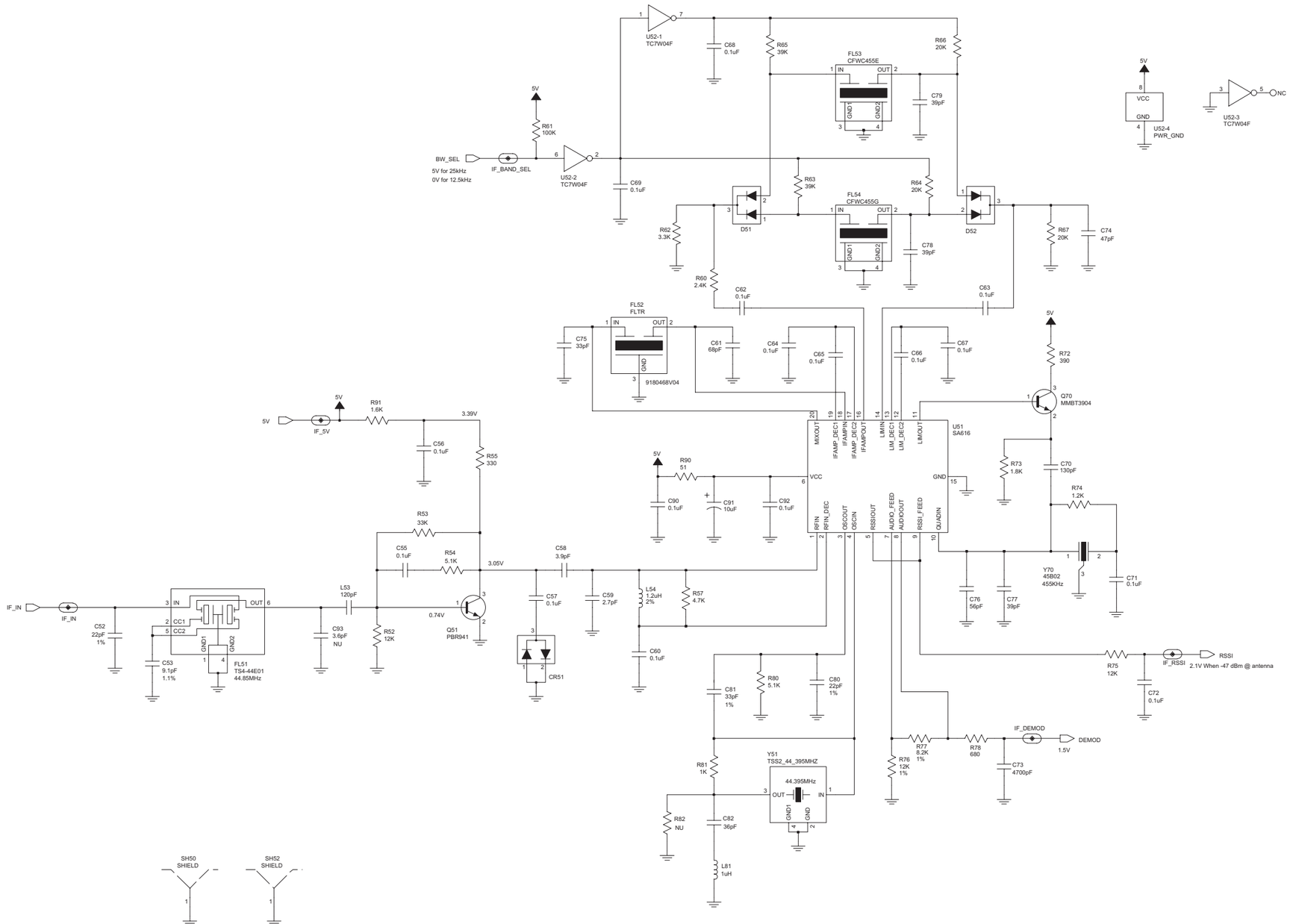
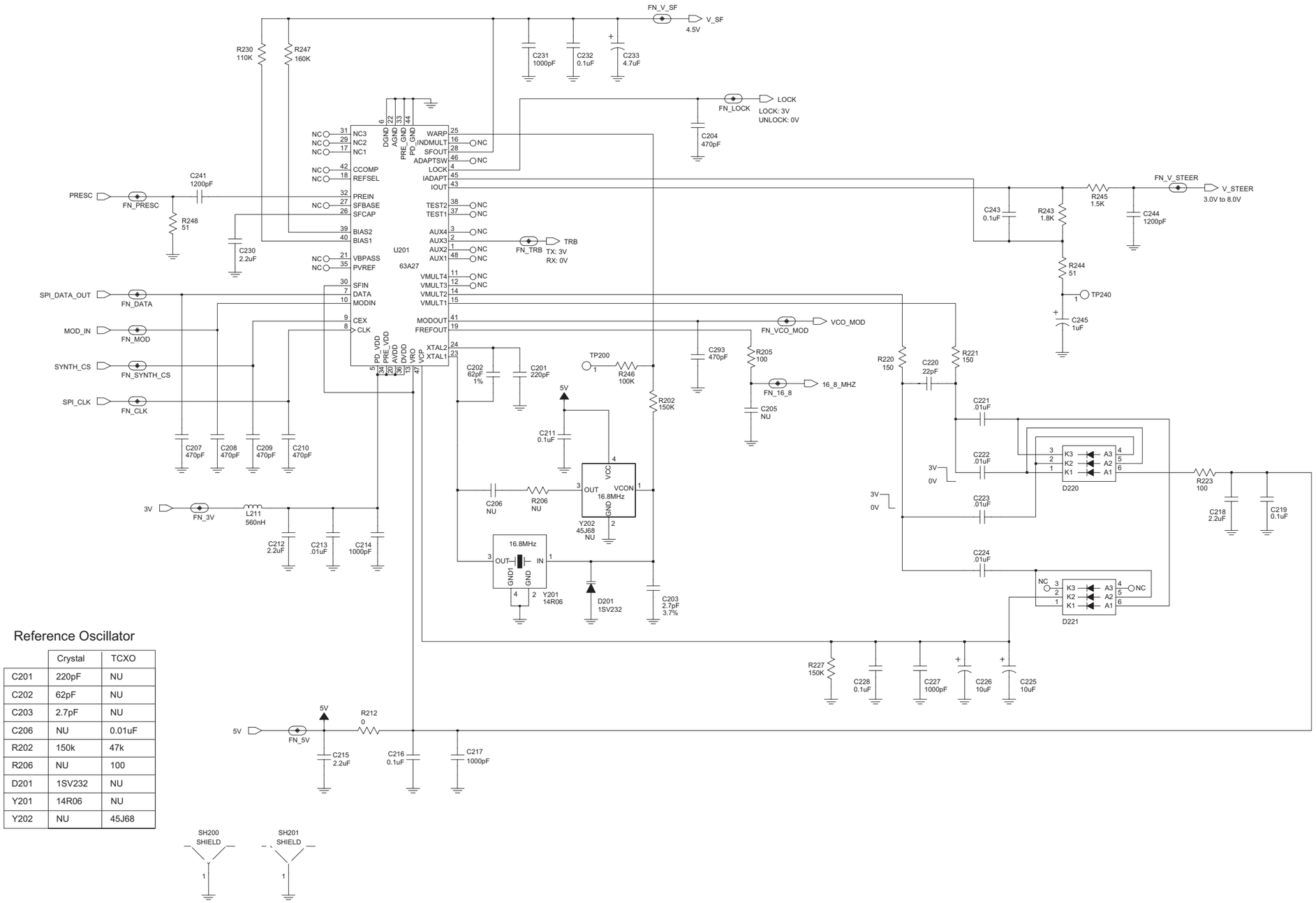


Figure 7-40. VHF (136–162 MHz) Receiver Back End Schematic Diagram (8486769Z08-G)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 7-41. VHF (136–162 MHz) Synthesizer Schematic Diagram (8486769Z08-G)

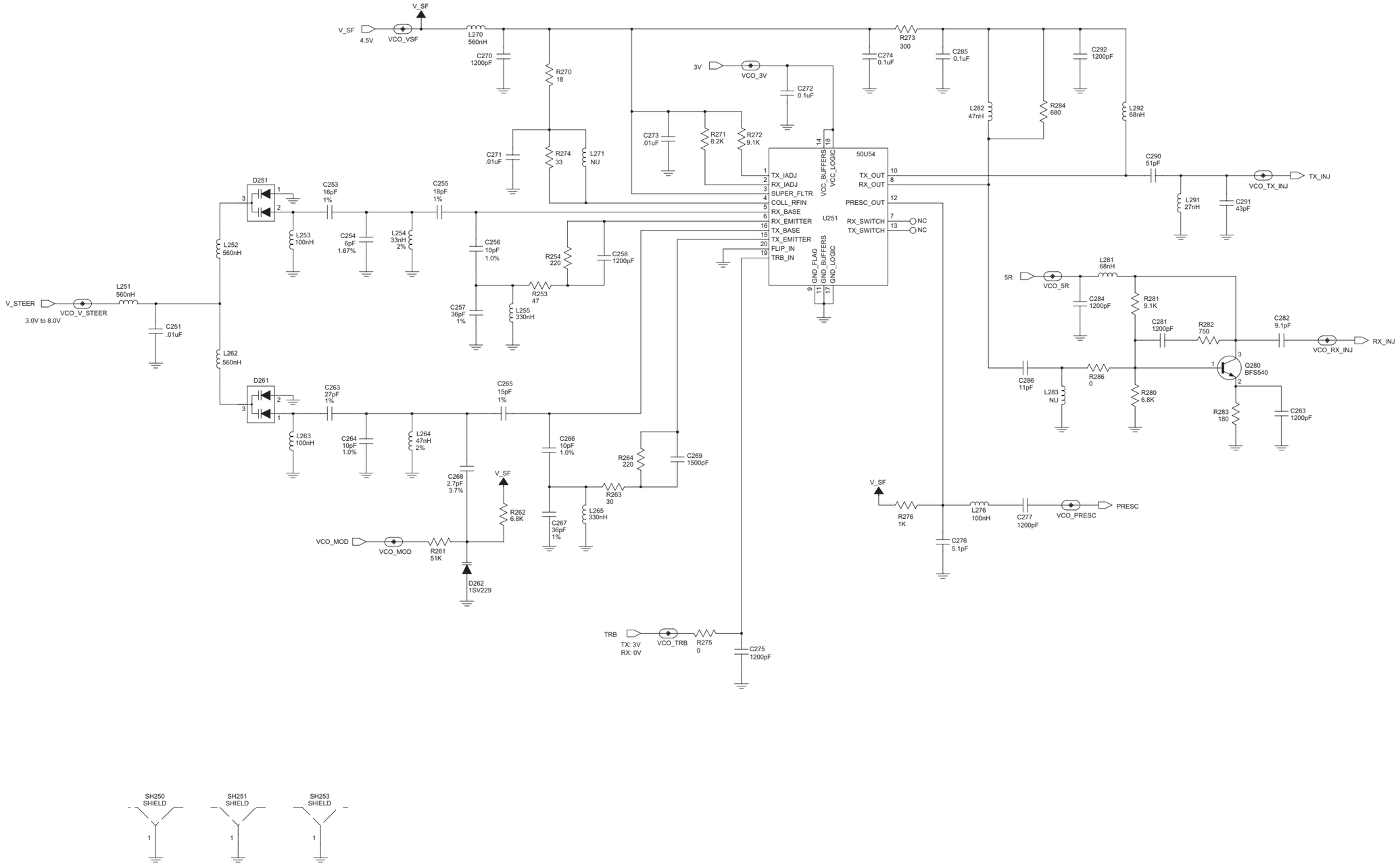


Figure 7-42. VHF (136–162 MHz) Voltage Controlled Oscillator Schematic Diagram (8486769Z08-G)

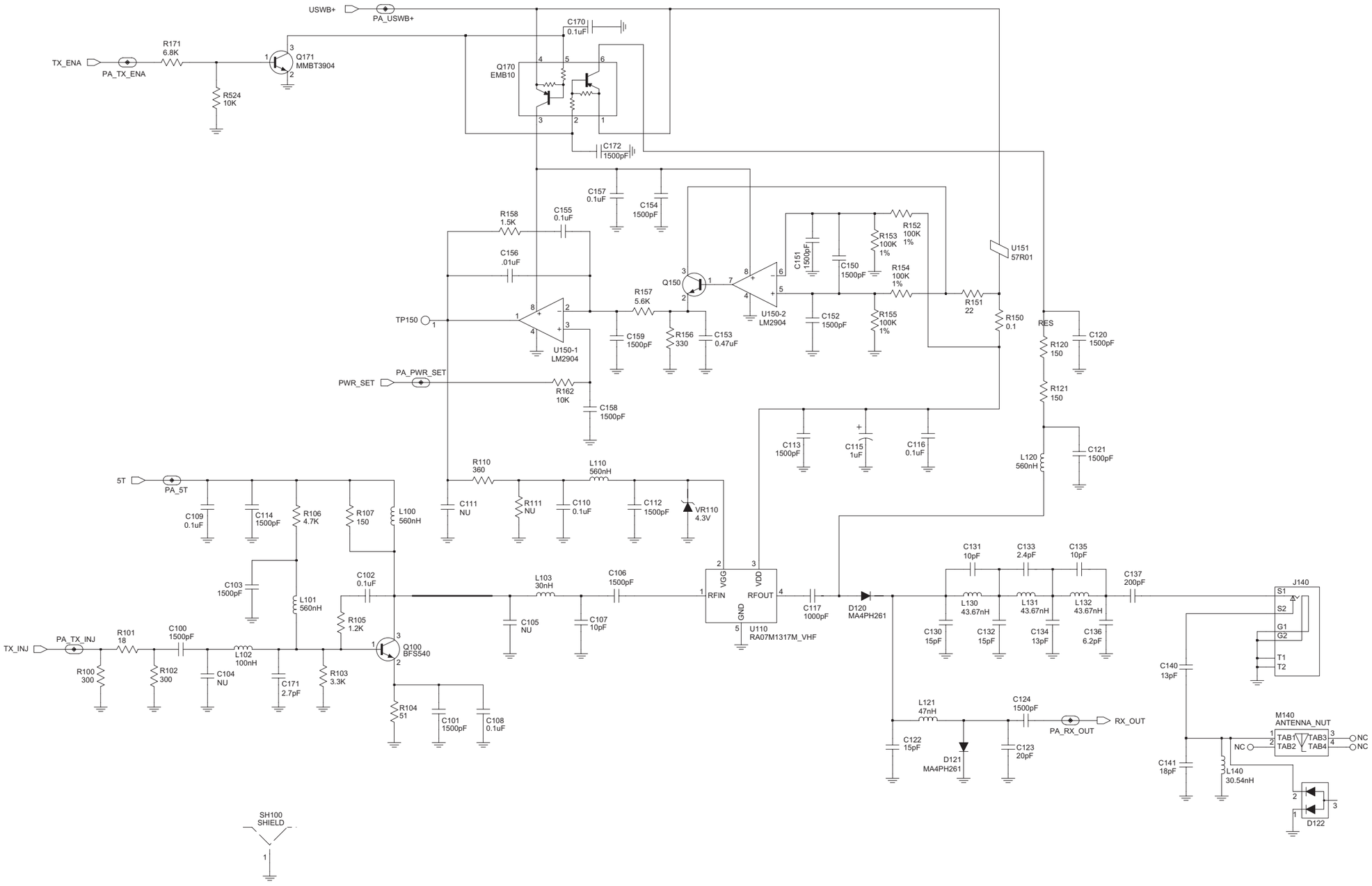


Figure 7-43. VHF (136–162 MHz) Transmitter and Power Control Schematic Diagram (8486769Z08-G)

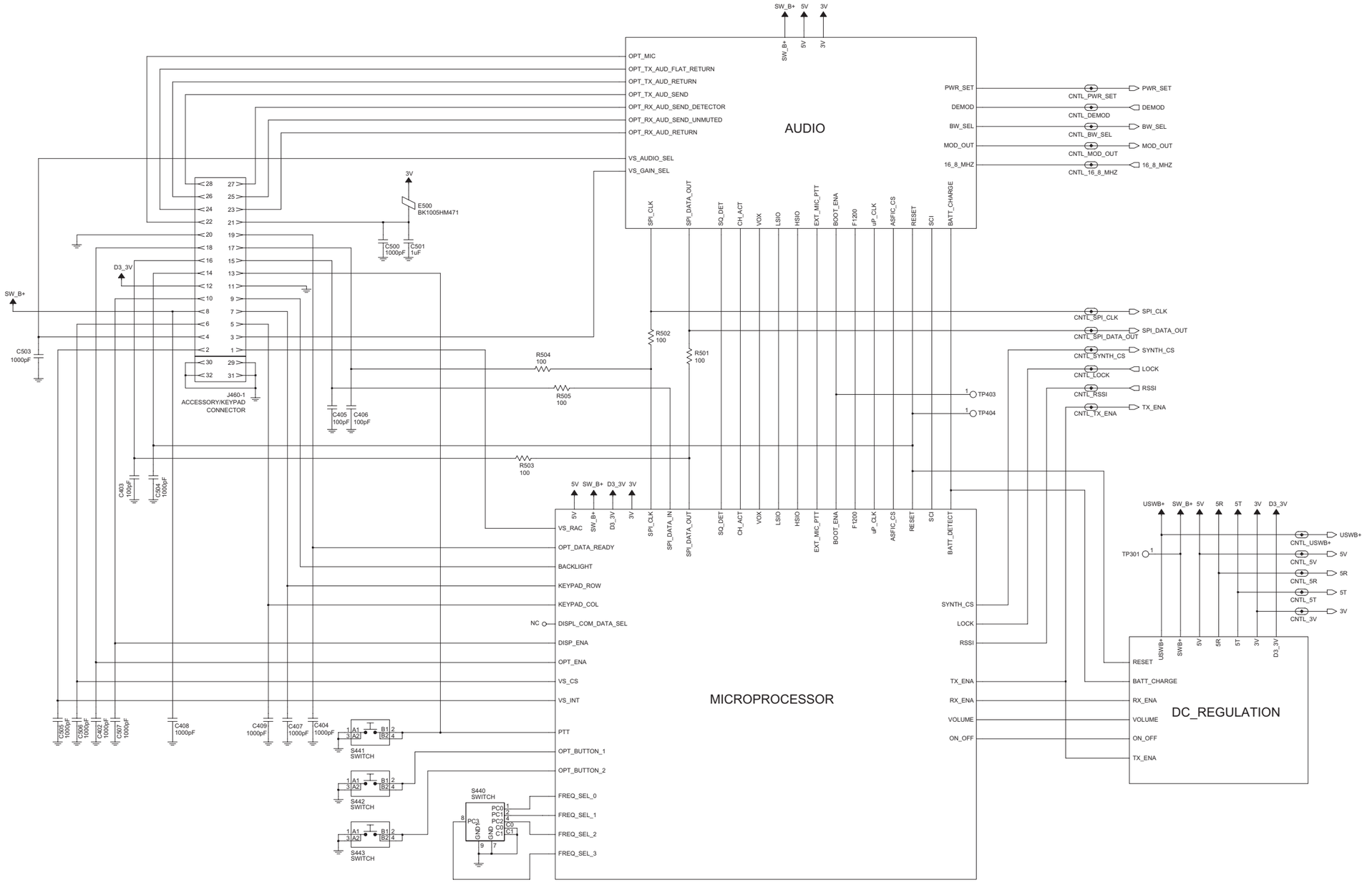


Figure 7-44. VHF (136–162 MHz) Controller Interconnect Schematic Diagram (8486769Z08-G)

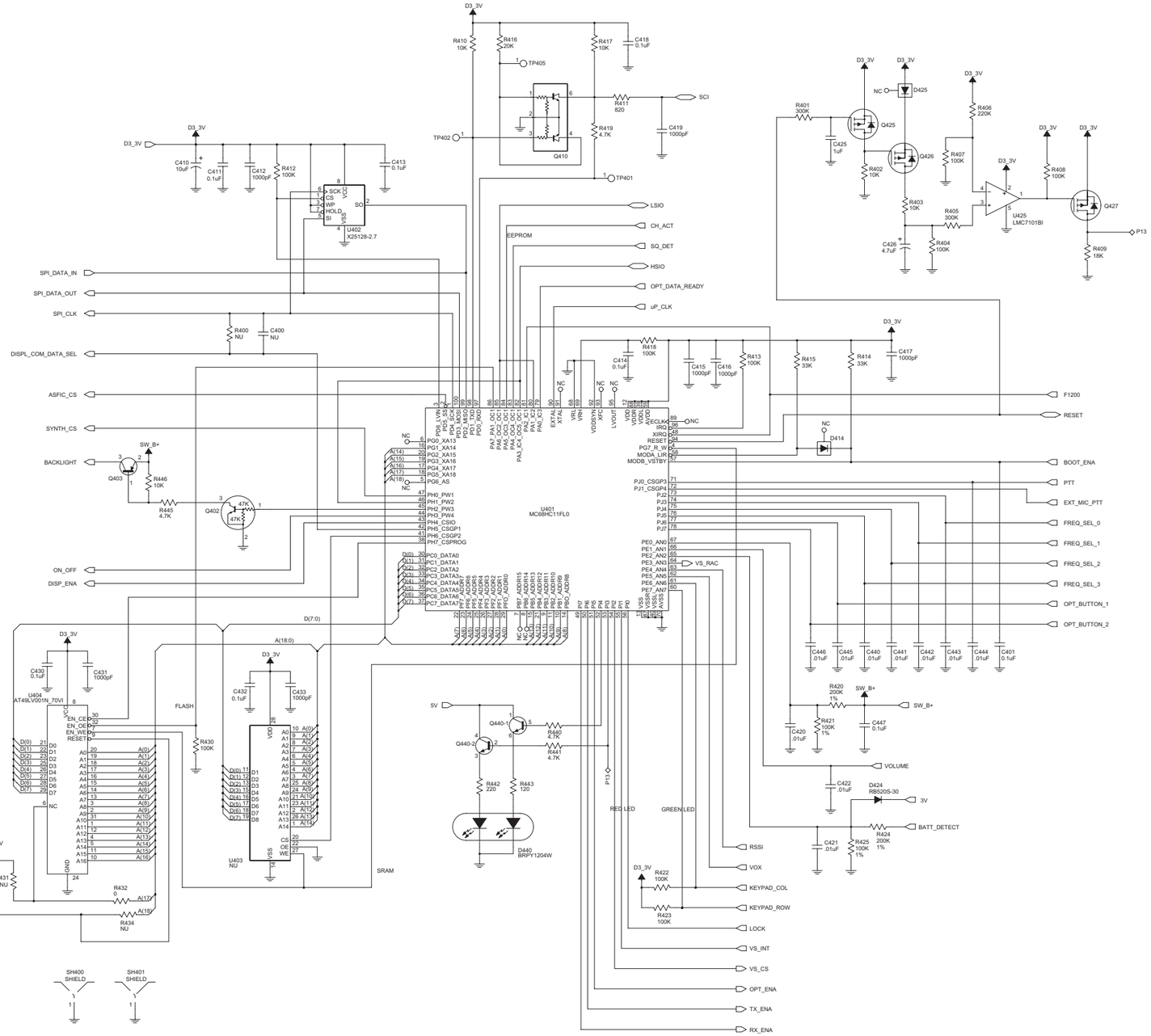


Figure 7-45. VHF (136–162 MHz) Microprocessor Circuitry Schematic Diagram (8486769Z08-G)

	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

Figure 7-46. VHF (136–162 MHz) Audio Circuitry Schematic Diagram (8486769Z08-G)

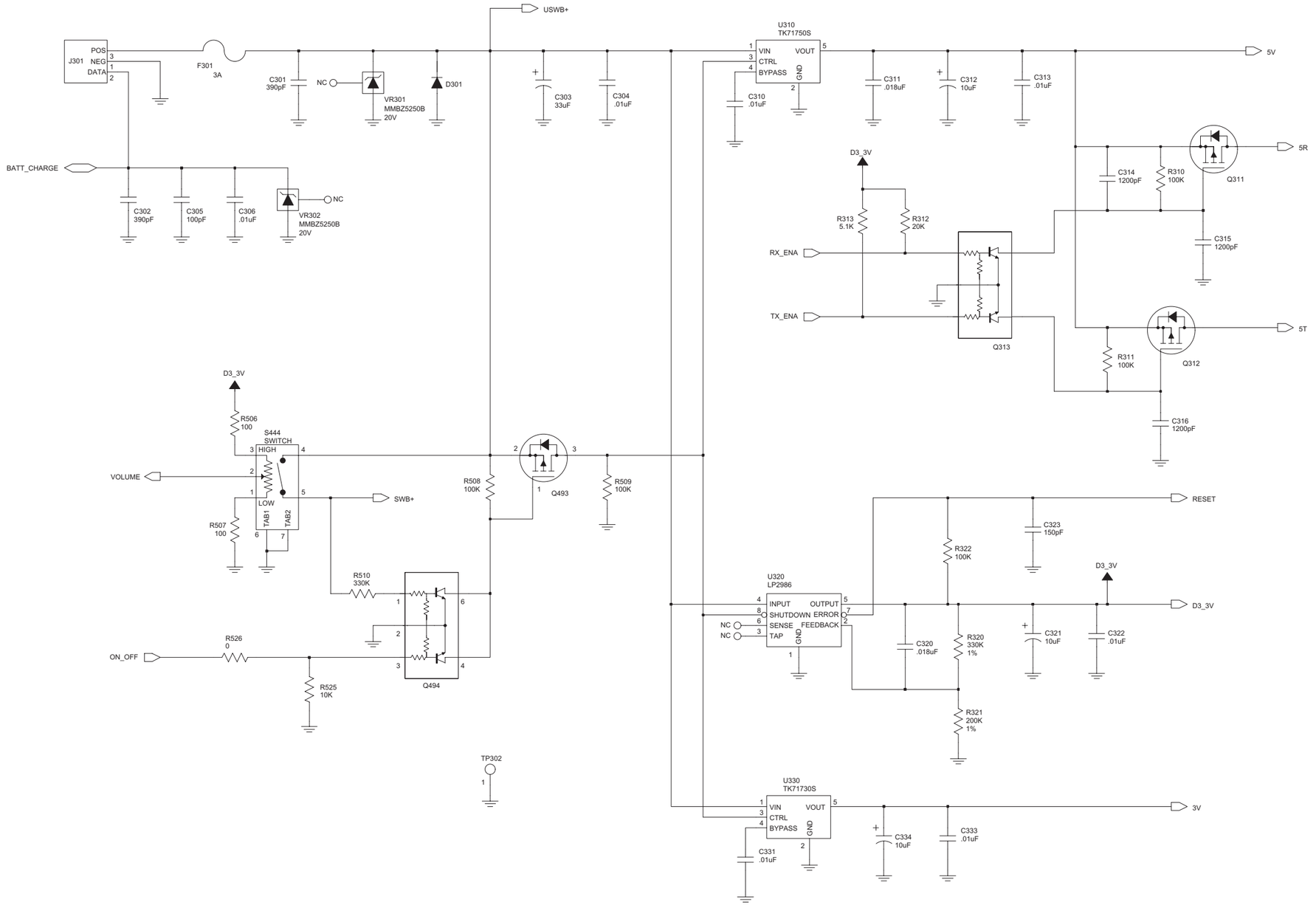


Figure 7-47. VHF (136–162 MHz) DC Regulation Schematic Diagram (8486769Z08-G)

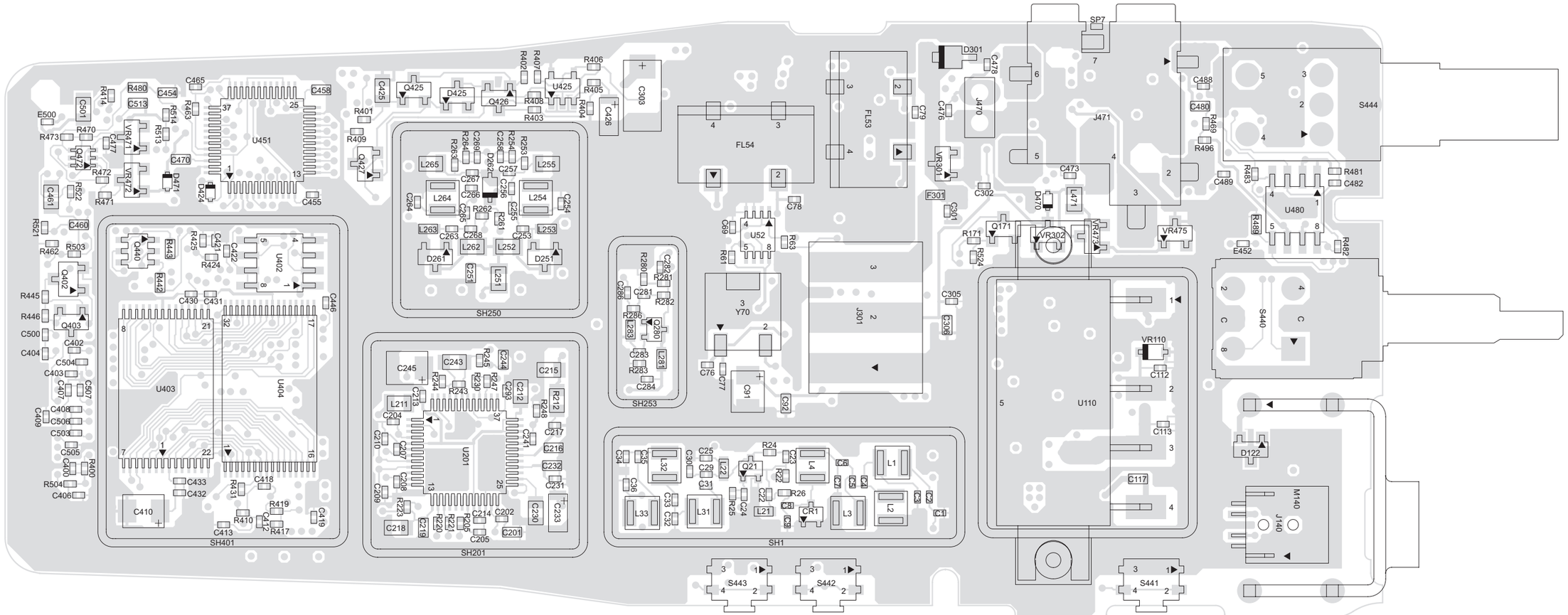


Figure 7-48. VHF (136–162 MHz) Board Component Side View (8486769Z08-G)

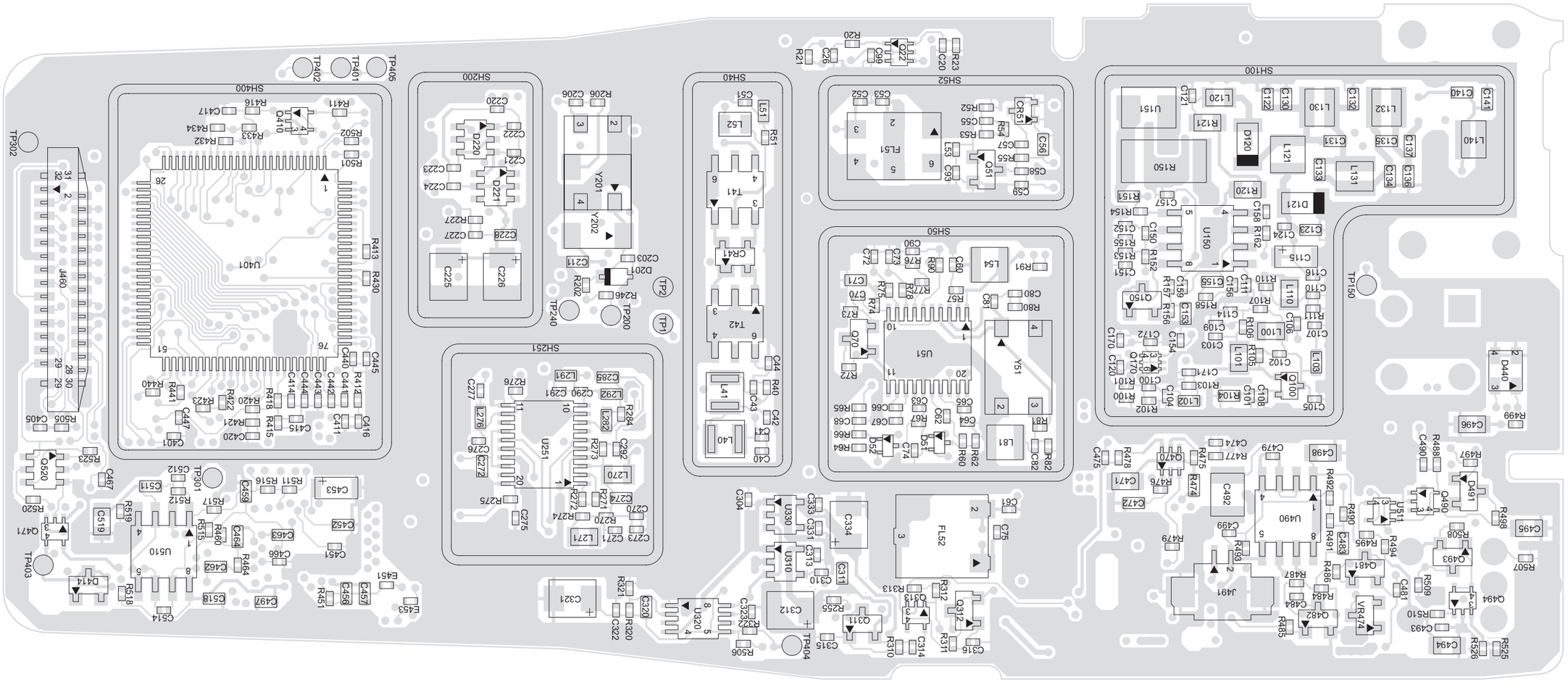


Figure 7-49. VHF (136–162 MHz) Board Solder Side View (8486769Z08-G)

VHF (136–162 MHz) Radio Parts List (8486769Z08-G)

Circuit Ref	Motorola Part No.	Description
C1	2115153H43	CAP, CERAMIC, COG
C2	2115153H48	CAP, CERAMIC, COG
C3	2115153H49	CAP, CERAMIC, COG
C4	2115153H39	CAP, CERAMIC, COG
C5	2115153H15	CAP, CERAMIC, COG
C6	2115153H41	CAP,CERAMIC CHIP,22PF, +1%,-1%,50V-
C7	2115153H45	CAP, CERAMIC, COG
C8	2115153H44	CAP, CERAMIC, COG
C9	NOT PLACED	64AM DUMMY PART NUMBER
C20	2113945A09	CAP CER CHP 1000PF 50V 10%
C22	2113945A09	CAP CER CHP 1000PF 50V 10%
C23	2113945A09	CAP CER CHP 1000PF 50V 10%
C24	NOT PLACED	64AM DUMMY PART NUMBER
C25	2113945A09	CAP CER CHP 1000PF 50V 10%
C26	2113945A09	CAP CER CHP 1000PF 50V 10%
C29	2115153H27	CAP, CERAMIC, COG
C30	2115153H44	CAP, CERAMIC, COG
C31	2115153H46	CAP, CERAMIC, COG
C32	2115153H53	CAP, CERAMIC, COG
C33	2115153H43	CAP, CERAMIC, COG
C34	2115153H53	CAP, CERAMIC, COG
C35	2115153H45	CAP, CERAMIC, COG
C36	2115153H44	CAP, CERAMIC, COG
C40	2115153H40	CAP, CERAMIC, COG
C41	2115153H37	CAP, CERAMIC, COG
C42	2115153H46	CAP, CERAMIC, COG
C43	2115153H37	CAP, CERAMIC, COG
C44	2115153H40	CAP, CERAMIC, COG
C51	2113944A38	CAP CER CHP 82.0PF 50V 5%
C52	2115153H41	CAP,CERAMIC CHIP,22PF, +1%,-1%,50V-
C53	2115153H26	CAP, CERAMIC, COG
C55	2113946K02	CAP CER CHP 0.10UF 16V
C56	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C57	2113946K02	CAP CER CHP 0.10UF 16V
C58	2113944A15	CAP CER CHP 3.9PF 50V +/- 0.25PF
C59	2113944A11	CAP CER CHP 2.7PF 50V +/- 0.25PF
C60	2113946K02	CAP CER CHP 0.10UF 16V
C61	2113944A36	CAP CER CHP 68.0PF 50V 5%
C62	2113946K02	CAP CER CHP 0.10UF 16V
C63	2113946K02	CAP CER CHP 0.10UF 16V
C64	2113946K02	CAP CER CHP 0.10UF 16V
C65	2113946K02	CAP CER CHP 0.10UF 16V
C66	2113946K02	CAP CER CHP 0.10UF 16V
C67	2113946K02	CAP CER CHP 0.10UF 16V
C68	2113946K02	CAP CER CHP 0.10UF 16V
C69	2113946K02	CAP CER CHP 0.10UF 16V
C70	2113944A87	CAP,FXD,130PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,P
C71	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C72	2113946K02	CAP CER CHP 0.10UF 16V
C73	2113945A13	CAP CER CHP 4700PF 50V 10%
C74	2113944A33	CAP CER CHP 47.0PF 50V 5%
C75	2113944A31	CAP CER CHP 33.0PF 50V 5%
C76	2113944A34	CAP CER CHP 56.0PF 50V 5%
C77	NOT PLACED	64AM DUMMY PART NUMBER
C78	2113944A32	CAP CER CHP 39.0PF 50V 5%
C79	2113944A32	CAP CER CHP 39.0PF 50V 5%
C80	2115153H41	CAP,CERAMIC CHIP,22PF, +1%,-1%,50V-
C81	2115153H45	CAP, CERAMIC, COG
C82	2115153H46	CAP, CERAMIC, COG
C90	2113946K02	CAP CER CHP 0.10UF 16V
C91	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C92	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C93	NOT PLACED	64AM DUMMY PART NUMBER
C99	2113946K02	CAP CER CHP 0.10UF 16V
C100	2113945A10	CAP CER CHP 1500PF 50V 10%
C101	2113945A10	CAP CER CHP 1500PF 50V 10%
C102	2113946K02	CAP CER CHP 0.10UF 16V
C103	2113945A10	CAP CER CHP 1500PF 50V 10%
C104	NOT PLACED	64AM DUMMY PART NUMBER
C105	NOT PLACED	64AM DUMMY PART NUMBER
C106	2113945A10	CAP CER CHP 1500PF 50V 10%
C107	2113944A25	CAP CER CHP 10.0PF 50V +/- 0.5PF
C108	2113946K02	CAP CER CHP 0.10UF 16V
C109	2113946K02	CAP CER CHP 0.10UF 16V
C110	2113946K02	CAP CER CHP 0.10UF 16V
C111	NOT PLACED	64AM DUMMY PART NUMBER
C112	2113945A10	CAP CER CHP 1500PF 50V 10%
C113	2113945A10	CAP CER CHP 1500PF 50V 10%
C114	2113945A10	CAP CER CHP 1500PF 50V 10%
C115	2313960B01	CAP,FXD,1UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,87MA,E
C116	2113946K02	CAP CER CHP 0.10UF 16V
C117	2113945L25	CAP,FXD,1000PF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C120	2113945A10	CAP CER CHP 1500PF 50V 10%
C121	2113945A10	CAP CER CHP 1500PF 50V 10%
C122	2113944C32	CAP CER CHP 15.0PF 50V 5%
C123	2113944C80	CAP,FXD,20PF,+5%,-5%, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX,PB
C124	2113945A10	CAP CER CHP 1500PF 50V 10%
C130	2113944C32	CAP CER CHP 15.0PF 50V 5%
C131	2113944C30	CAP CER CHP 10.0PF 50V +/- 0.5PF
C132	2113944C32	CAP CER CHP 15.0PF 50V 5%
C133	2113944C15	CAP CER CHP 2.4PF 50V +/- 0.25PF
C134	2113944C78	CAP,FXD,13PF,+5%,-5%, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX,PB
C135	2113944C30	CAP CER CHP 10.0PF 50V +/- 0.5PF
C136	2113944C72	CAP,FXD,6.2PF,.25PF+/-, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX
C137	2113944C89	CAP,FXD,200PF,+5%,-5%, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX,P
C140	2113944C79	CAP,FXD,16PF,+5%,-5%, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX,PB
C141	2113944C34	CAP CER CHP 22.0PF 50V 5%
C150	2113945A10	CAP CER CHP 1500PF 50V 10%
C151	2113945A10	CAP CER CHP 1500PF 50V 10%
C152	2113945A10	CAP CER CHP 1500PF 50V 10%
C153	2113946L04	CAP CER CHP 0.47UF 16V
C154	2113945A10	CAP CER CHP 1500PF 50V 10%
C155	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C156	2113945B02	CAP CER CHP 10,000PF 25V 10%
C157	2113946K02	CAP CER CHP 0.10UF 16V
C158	2113945A10	CAP CER CHP 1500PF 50V 10%
C159	2113945A10	CAP CER CHP 1500PF 50V 10%
C170	2113946K02	CAP CER CHP 0.10UF 16V
C171	2113944A11	CAP CER CHP 2.7PF 50V +/- 0.25PF
C172	2113945A10	CAP CER CHP 1500PF 50V 10%
C201	2113944C02	CAP CER CHP 220.0PF 50V 5%
C202	2115153H52	CAP, CERAMIC, COG
C203	2115153H13	CAP, CERAMIC, COG
C204	2113945A05	CAP CER CHP 470PF 50V 10%
C205	NOT PLACED	64AM DUMMY PART NUMBER
C206	NOT PLACED	64AM DUMMY PART NUMBER
C207	2113945A05	CAP CER CHP 470PF 50V 10%
C208	2113945A05	CAP CER CHP 470PF 50V 10%

Circuit Ref	Motorola Part No.	Description
C209	2113945A05	CAP CER CHP 470PF 50V 10%
C210	2113945A05	CAP CER CHP 470PF 50V 10%
C211	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C212	2113946N03	CAP CER CHP 2.2UF 16V
C213	2113945B02	CAP CER CHP 10,000PF 25V 10%
C214	2113945A09	CAP CER CHP 1000PF 50V 10%
C215	2113946N03	CAP CER CHP 2.2UF 16V
C216	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C217	2113945A09	CAP CER CHP 1000PF 50V 10%
C218	2113946N03	CAP CER CHP 2.2UF 16V
C219	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C220	2113944A29	CAP CER CHP 22.0PF 50V 5%
C221	2113945B02	CAP CER CHP 10,000PF 25V 10%
C222	2113945B02	CAP CER CHP 10,000PF 25V 10%
C223	2113945B02	CAP CER CHP 10,000PF 25V 10%
C224	2113945B02	CAP CER CHP 10,000PF 25V 10%
C225	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C226	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C227	2113945A09	CAP CER CHP 1000PF 50V 10%
C228	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C230	2113946N03	CAP CER CHP 2.2UF 16V
C231	2113945A09	CAP CER CHP 1000PF 50V 10%
C232	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C233	2313960B30	CAP,FXD,4.7UF,+10%,-10%, 10V-DC,SM,-55DEG CMIN, 125DEG CMAX,122MA
C241	2113945A60	CAP,FXD,1200PF,+10%,-10%, 50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C243	2113945G91	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0805,X7R,-55DEG CMIN,125DEG CMAX
C244	2113945L27	CAP,FXD,1200PF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C245	2313960C26	CAP,FXD,1UF,+10%,-10%, 35V-DC,SM,-55DEG CMIN, 125DEG CMAX,114MA,E
C251	2113945L49	CAP,FXD,.01UF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX,P
C253	2115153H38	CAP, CERAMIC, COG
C254	2115153H30	CAP, CERAMIC, COG
C255	2115153H39	CAP, CERAMIC, COG
C256	2115153H27	CAP, CERAMIC, COG
C257	2115153H46	CAP, CERAMIC, COG
C258	2113945A60	CAP,FXD,1200PF,+10%,-10%, 50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C263	2115153H43	CAP, CERAMIC, COG
C264	2115153H27	CAP, CERAMIC, COG
C265	2115153H37	CAP, CERAMIC, COG
C266	2115153H27	CAP, CERAMIC, COG
C267	2115153H46	CAP, CERAMIC, COG
C268	2115153H13	CAP, CERAMIC, COG
C269	2113945A10	CAP CER CHP 1500PF 50V 10%
C270	2113945A60	CAP,FXD,1200PF,+10%,-10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C271	2113945B02	CAP CER CHP 10,000PF 25V 10%
C272	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C273	2113945B02	CAP CER CHP 10,000PF 25V 10%
C274	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C275	2113945A60	CAP,FXD,1200PF,+10%,-10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C276	2113944A18	CAP CER CHP 5.1PF 50V +/- 0.5PF
C277	2113945A60	CAP,FXD,1200PF,+10%,-10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C281	2113945A60	CAP,FXD,1200PF,+10%,-10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C282	2113944A24	CAP CER CHP 9.1PF 50V +/- 0.5PF
C283	2113945A60	CAP,FXD,1200PF,+10%,-10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C284	2113945A60	CAP,FXD,1200PF,+10%,-10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C285	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C286	2113944A77	CAP,FXD,11PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C290	2113944A85	CAP,FXD,51PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C291	2115153H48	CAP, CERAMIC, COG
C292	2113945A60	CAP,FXD,1200PF,+10%,-10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C293	2113945A05	CAP CER CHP 470PF 50V 10%
C301	2113945A04	CAP CER CHP 390PF 50V 10%
C302	2113945A04	CAP CER CHP 390PF 50V 10%
C303	2313960F04	CAP,FXD,33UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,303MA
C304	2113945B02	CAP CER CHP 10,000PF 25V 10%
C305	2113944A40	CAP CER CHP 100.0PF 50V 5%
C306	2113945L49	CAP,FXD,.01UF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX,P
C310	2113945B02	CAP CER CHP 10,000PF 25V 10%
C311	2113945C21	CAP,FXD,.018UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMA
C312	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C313	2113945B02	CAP CER CHP 10,000PF 25V 10%
C314	2113945A60	CAP,FXD,1200PF,+10%,-10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C315	2113945A60	CAP,FXD,1200PF,+10%,-10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C316	2113945A60	CAP,FXD,1200PF,+10%,-10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C320	2113945C21	CAP,FXD,.018UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMA
C321	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C322	2113945B02	CAP CER CHP 10,000PF 25V 10%
C323	2113944A42	CAP CER CHP 150.0PF 50V 5%
C331	2113945B02	CAP CER CHP 10,000PF 25V 10%
C333	2113945B02	CAP CER CHP 10,000PF 25V 10%
C334	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C400	NOT PLACED	64AM DUMMY PART NUMBER
C401	2113946K02	CAP CER CHP 0.10UF 16V
C402	2113945A09	CAP CER CHP 1000PF 50V 10%
C403	2113944A40	CAP CER CHP 100.0PF 50V 5%
C404	2113945A09	CAP CER CHP 1000PF 50V 10%
C405	2113944A40	CAP CER CHP 100.0PF 50V 5%
C406	2113944A40	CAP CER CHP 100.0PF 50V 5%
C407	2113945A09	CAP CER CHP 1000PF 50V 10%
C408	2113945A09	CAP CER CHP 1000PF 50V 10%
C409	2113945A09	CAP CER CHP 1000PF 50V 10%

Circuit Ref	Motorola Part No.	Description
C410	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C411	2113946K02	CAP CER CHP 0.10UF 16V
C412	2113945A09	CAP CER CHP 1000PF 50V 10%
C413	2113946K02	CAP CER CHP 0.10UF 16V
C414	2113946K02	CAP CER CHP 0.10UF 16V
C415	2113945A09	CAP CER CHP 1000PF 50V 10%
C416	2113945A09	CAP CER CHP 1000PF 50V 10%
C417	2113945A09	CAP CER CHP 1000PF 50V 10%
C418	2113946K02	CAP CER CHP 0.10UF 16V
C419	2113945A09	CAP CER CHP 1000PF 50V 10%
C420	2113945B02	CAP CER CHP 10,000PF 25V 10%
C421	2113945B02	CAP CER CHP 10,000PF 25V 10%
C422	2113945B02	CAP CER CHP 10,000PF 25V 10%
C425	2113946E02	CAP CER CHP 1.0UF 16V 10%
C426	2313960B01	CAP,FXD,1UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,87MA,E
C430	2113946K02	CAP CER CHP 0.10UF 16V
C431	2113945A09	CAP CER CHP 1000PF 50V 10%
C432	2113946K02	CAP CER CHP 0.10UF 16V
C433	2113945A09	CAP CER CHP 1000PF 50V 10%
C440	2113945B02	CAP CER CHP 10,000PF 25V 10%
C441	2113945B02	CAP CER CHP 10,000PF 25V 10%
C442	2113945B02	CAP CER CHP 10,000PF 25V 10%
C443	2113945B02	CAP CER CHP 10,000PF 25V 10%
C444	2113945B02	CAP CER CHP 10,000PF 25V 10%
C445	2113945B02	CAP CER CHP 10,000PF 25V 10%
C446	2113945B02	CAP CER CHP 10,000PF 25V 10%
C447	2113946K02	CAP CER CHP 0.10UF 16V
C451	2113946K02	CAP CER CHP 0.10UF 16V
C452	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C453	2313960B30	CAP,FXD,4.7UF,+10%,-10%, 10V-DC,SM,-55DEG CMIN, 125DEG CMAX,122MA
C454	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C455	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C456	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C457	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C458	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C459	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C460	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C461	2113946F03	CAP CER CHP 4.7UF 6.3V 10%
C462	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C463	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C464	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C465	2113945A09	CAP CER CHP 1000PF 50V 10%
C466	NOT PLACED	64AM DUMMY PART NUMBER
C467	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C470	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C471	2113946N03	CAP CER CHP 2.2UF 16V
C472	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C473	2113944A42	CAP CER CHP 150.0PF 50V 5%
C474	2113944A42	CAP CER CHP 150.0PF 50V 5%
C475	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C476	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C477	2113946K02	CAP CER CHP 0.10UF 16V
C478	2113944A42	CAP CER CHP 150.0PF 50V 5%
C479	2113944A42	CAP CER CHP 150.0PF 50V 5%
C480	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C481	NOT PLACED	64AM DUMMY PART NUMBER
C482	NOT PLACED	64AM DUMMY PART NUMBER
C483	2113946C02	CAP CER CHP 0.22UF 10V 10%
C484	NOT PLACED	64AM DUMMY PART NUMBER
C488	2113945A05	CAP CER CHP 470PF 50V 10%
C489	2113945A05	CAP CER CHP 470PF 50V 10%
C490	2113945A05	CAP CER CHP 470PF 50V 10%
C492	2113955E37	CAP,FXD,10UF,+10%,-10%, 16V-DC,1210,X7R,-55DEG CMIN,125DEG CMAX
C493	2113945A09	CAP CER CHP 1000PF 50V 10%
C494	2113946N03	CAP CER CHP 2.2UF 16V
C495	2113946N02	CAP CER CHP 1.0UF 16V
C496	2113946N02	CAP CER CHP 1.0UF 16V
C497	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C498	2113946N02	CAP CER CHP 1.0UF 16V
C499	2113944A32	CAP CER CHP 39.0PF 50V 5%
C500	2113945A09	CAP CER CHP 1000PF 50V 10%
C501	2113946N02	CAP CER CHP 1.0UF 16V
C503	2113945A09	CAP CER CHP 1000PF 50V 10%
C504	2113945A09	CAP CER CHP 1000PF 50V 10%
C505	2113945A09	CAP CER CHP 1000PF 50V 10%
C506	2113945A09	CAP CER CHP 1000PF 50V 10%
C507	2113945A09	CAP CER CHP 1000PF 50V 10%
C511	2113944C02	CAP CER CHP 220.0PF 50V 5%
C512	2113944A21	CAP CER CHP 6.8PF 50V +/- 0.5PF
C513	2113944C02	CAP CER CHP 220.0PF 50V 5%
C514	2113944A79	CAP,FXD,16PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C518	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C519	2113946N02	CAP CER CHP 1.0UF 16V
CR1	4813974A19	DIODE ARRAY,MXR,SM, SOT-323,7V,.2W,SHTK,2, PB-FREE
CR41	4815923H01	SCHOTTKY DIODE-NEW LEADFREE
CR51	4813974A19	DIODE ARRAY,MXR,SM, SOT-323,7V,.2W,SHTK,2, PB-FREE
D51	4815047H01	BAND SWITCHIND DIODE,ROHM DAN
D52	4815047H01	BAND SWITCHIND DIODE,ROHM DAN
D120	4880973Z02	PIN DIODE
D121	4880973Z02	PIN DIODE
D122	4813978C06	DIODE ARRAY,SIGNL/SWG, BD2836,SM,SOT-23,100MA, 75V,.225W,SHTK,2,PB
D201	4815072H01	DIODE VARACTOR
D220	4815011H01	DIODE TRIPLE
D221	4815011H01	DIODE TRIPLE
D251	4885094Y01	DIODE VARACTOR ISV228 W18
D261	4885094Y01	DIODE VARACTOR ISV228 W18
D262	4885055Y01	DIODE VARACTOR PB-FREE

Circuit Ref	Motorola Part No.	Description
D301	4815713H01	DIODE SCHOTTKY 1A 20V PWRMITE
D414	4816064H01	SOT SMBD1022 RH29M19 LH PB-FREE
D424	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D425	4816064H01	SOT SMBD1022 RH29M19 LH PB-FREE
D440	4805729G49	DIODE RED/YEL
D470	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D471	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D491	NOT PLACED	64AM DUMMY PART NUMBER
E451	2480640Z01	SURFACE MOUNT FERRITE BEAD
E452	2480640Z01	SURFACE MOUNT FERRITE BEAD
E453	2480640Z01	SURFACE MOUNT FERRITE BEAD
E500	2480640Z01	SURFACE MOUNT FERRITE BEAD
F301	6515076H01	FUSE CHIP SMT TR/1608FF 3A
FL51	9180022M11	XTAL FILTER 44.85MHZ
FL52	9180468V04	SMD455KHZ 4 ELEMENT CER FLTR
FL53	9115811H03	SMD455KHZ 6 ELEMENT
FL54	9115811H01	SMD455KHZ 6 ELEMENT
J140	0986428Z02	CONNECTOR, RF
J301	0986565Z02	CONNECTOR CONTACT BATTERY
J460	0986615Z02	CONN,ZIF,F,28CONT,,TIN,,,CBL
J470	0985818A02	CONNECTOR, MICROPHONE, 2-PIN
J471	0980683Z03	AUDIO JACK (MONO & STEREO)
J491	2815162H01	HEADER SMT HORZ MOUNT LEAD-FREE
L1	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L2	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L3	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L4	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L21	NOT PLACED	64AM DUMMY PART NUMBER
L22	2414017N24	IDCTR,CHIP,100NH,5%,300MA,2OHM,CER,14 Q, 700MHZ SRF,SM,0603,P
L31	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L32	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L33	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L40	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L41	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L51	2414017N26	IDCTR,CHIP,150NH,5%,200MA,2.4OHM,CER,11 Q, 550MHZ SRF,SM,0603
L52	2414032F43	IDCTR,WW,560NH,10%,170MA,3.5OHM,CER,40 Q, 635MHZ SRF,SM,PB-F
L53	2113944A41	CAP CER CHP 120.0PF 50V 5%
L54	2414015A25	IDCTR,FXD,1.2UH,2%,440MA,2OHM,CER,20 Q,200MHZ SRF,SM,1008,PB
L81	2414015A19	IDCTR,FXD,1UH,2%,460MA, 1.75OHM,CER,33 Q,290MHZ SRF,SM,1008,P
L100	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L101	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L102	2415429H36	CHIP INDUCTOR
L103	2415429H25	CHIP INDUCTOR
L110	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L120	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L121	2414032B49	IDCTR,WW,47NH,5%,1A,.16OHM,CER,50 Q,1.35GHZ SRF,SM,PB-FREE
L130	2479990N01	INDUCTOR,AIR WOUND, 43.67NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND(GREEN COLOUR)
L131	2479990N01	INDUCTOR,AIR WOUND, 43.67NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND(GREEN COLOUR)
L132	2479990N01	INDUCTOR,AIR WOUND, 43.67NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND(GREEN COLOUR)
L140	2479990M01	INDUCTOR,AIR WOUND, 30.54NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND(GREEN COLOUR)
L211	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L251	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L252	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L253	2415429H36	CHIP INDUCTOR
L254	2414015C05	IDCTR,FXD,33NH,2%,1.3MA,.09OHM,CER,75 Q,1.7GHZ SRF,SM,1008,P
L255	2414017K29	IDCTR,CHIP,330NH,5%,150MA,1.5OHM,CER,11 Q, 250MHZ SRF,SM,0805
L262	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L263	2415429H36	CHIP INDUCTOR
L264	2414015C07	IDCTR,FXD,47NH,2%,1.2MA,.12OHM,CER,75 Q,1.45GHZ SRF,SM,1008
L265	2414017K29	IDCTR,CHIP,330NH,5%,150MA,1.5OHM,CER,11 Q, 250MHZ SRF,SM,0805
L270	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L271	NOT PLACED	64AM DUMMY PART NUMBER
L276	2414017N24	IDCTR,CHIP,100NH,5%,300MA,2OHM,CER,14 Q, 700MHZ SRF,SM,0603,P
L281	2414017N22	IDCTR,CHIP,68NH,5%,400MA,1.2OHM,CER,14 Q, 800MHZ SRF,SM,0603
L282	2414017N20	IDCTR,CHIP,47NH,5%,500MA,.86OHM,CER,14 Q, 900MHZ SRF,SM,0603
L283	NOT PLACED	64AM DUMMY PART NUMBER
L291	2414017N17	IDCTR,CHIP,27NH,5%,600MA,.62OHM,CER,12 Q,1.2GHZ SRF,SM,0603
L292	2414017N22	IDCTR,CHIP,68NH,5%,400MA,1.2OHM,CER,14 Q, 800MHZ SRF,SM,0603
L471	2414017K30	IDCTR,CHIP,390NH,5%,150MA,1.8OHM,CER,11Q,200MHZSRF,SM,0805,P
M140	0286427Z02	NUT, ANTENNA
PASTE	1085674C03	PASTE/NC-SMQ230
Q21	4802245J95	BJT, NPN TRANSISTOR
Q22	4815267H01	DBRT UMT1NFTN
Q51	4802197J95	RF TRANSISTOR PBR941
Q70	4813973M07	XSTR,BIP GP SS,NPN, T3904,SM,SOT-23,SMT,40V, .225W,200MA,300MHZ
Q100	4802245J95	BJT, NPN TRANSISTOR
Q150	4813973M07	XSTR,BIP GP SS,NPN, T3904,SM,SOT-23,SMT,40V, .225W,200MA,300MHZ
Q170	4809939C34	TSTR DUAL PNP EMB10T2R EMT6
Q171	4813973M07	XSTR,BIP GP SS,NPN, T3904,SM,SOT-23,SMT,40V, .225W,200MA,300MHZ
Q280	4802245J95	BJT, NPN TRANSISTOR
Q311	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q312	4885316E25	TSTR MOSFET P-CHAN TP0101T

Circuit Ref	Motorola Part No.	Description
Q313	4815066H01	UMG5N DIGITAL TRANSISTOR
Q402	4813973A42	XSTR,BIP GP SS,NPN,SM, SC-59,SMT,50V,.23W,100MA, PB-FREE
Q403	4813973A13	XSTR,GEN PURPOSE SMALL SIG,PNP, MMBT3906L,TO-236,4, PB-FREE
Q410	4815066H01	UMG5N DIGITAL TRANSISTOR
Q425	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q426	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q427	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q440	4815154H01	DUAL TRANS NPN
Q470	4815267H01	DBRT UMT1NFTN
Q471	4815066H01	UMG5N DIGITAL TRANSISTOR
Q472	4815267H01	DBRT UMT1NFTN
Q481	NOT PLACED	64AM DUMMY PART NUMBER
Q482	NOT PLACED	64AM DUMMY PART NUMBER
Q490	4815066H01	UMG5N DIGITAL TRANSISTOR
Q493	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q494	4815066H01	UMG5N DIGITAL TRANSISTOR
Q520	4815154H01	DUAL TRANS NPN
R20	0613952Z52	RES,MF,6.8KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R21	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R22	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R23	0613952Z58	RES,MF,22KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R24	0613952Q70	CER CHIP RES 750 OHM 5% 0402
R25	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R26	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R40	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R51	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R52	0613952R03	CER CHIP RES 12K OHM 5% 0402
R53	0613952R13	CER CHIP RES 33K OHM 5% 0402
R54	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R55	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R57	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R60	0613952Q82	CER CHIP RES 2400 OHM 5% 0402
R61	0613952R25	CER CHIP RES 100K OHM 5% 0402
R62	0613952Q85	CER CHIP RES 3300 OHM 5% 0402
R63	0613952R15	CER CHIP RES 39K OHM 5% 0402
R64	0613952R08	CER CHIP RES 20K OHM 5% 0402
R65	0613952R15	CER CHIP RES 39K OHM 5% 0402
R66	0613952R08	CER CHIP RES 20K OHM 5% 0402
R67	0613952R08	CER CHIP RES 20K OHM 5% 0402
R72	0613952Q63	CER CHIP RES 390 OHM 5% 0402
R73	0613952Q79	CER CHIP RES 1800 OHM 5% 0402
R74	0613952Q75	CER CHIP RES 1200 OHM 5% 0402
R75	0613952R03	CER CHIP RES 12K OHM 5% 0402
R76	0613952Z55	RES,MF,12KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R77	0613952Z53	RES,MF,8.2KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R78	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R80	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R81	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R82	NOT PLACED	64AM DUMMY PART NUMBER
R90	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R91	0613952Q78	CER CHIP RES 1600 OHM 5% 0402
R100	0613952Q60	CER CHIP RES 300 OHM 5% 0402
R101	0613952Q31	CER CHIP RES 18.0 OHM 5% 0402
R102	0613952Q60	CER CHIP RES 300 OHM 5% 0402
R103	0613952Q85	CER CHIP RES 3300 OHM 5% 0402
R104	0613952H42	CER CHIP RES 51.0 OHM 5% 0603
R105	0613952Q75	CER CHIP RES 1200 OHM 5% 0402
R106	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R107	0613952Q53	CER CHIP RES 150 OHM 5% 0402
R110	0613952Q62	CER CHIP RES 360 OHM 5% 0402
R111	0613952R01	CER CHIP RES 10K OHM 5% 0402
R120	0613958H53	CER CHIP RES 150 OHM 5% 0805
R121	0613958H53	CER CHIP RES 150 OHM 5% 0805
R150	0615043C01	RES POWER METAL STRIP W18 COMPLIANT
R151	0613952H33	CER CHIP RES 22.0 OHM 5% 0603
R152	0613952P01	CER CHIP RES 100K OHM 1% 0402
R153	0613952P01	CER CHIP RES 100K OHM 1% 0402
R154	0613952P01	CER CHIP RES 100K OHM 1% 0402
R155	0613952P01	CER CHIP RES 100K OHM 1% 0402
R156	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R157	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R158	0613952Q77	CER CHIP RES 1500 OHM 5% 0402
R162	0613952R01	CER CHIP RES 10K OHM 5% 0402
R171	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R202	0613952R29	CER CHIP RES 150K OHM 5% 0402
R205	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R206	NOT PLACED	64AM DUMMY PART NUMBER
R212	0613958J74	CER CHIP RES 0.0 OHM JMP 0805
R220	0613952Q53	CER CHIP RES 150 OHM 5% 0402
R221	0613952Q53	CER CHIP RES 150 OHM 5% 0402
R223	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R227	0613952R29	CER CHIP RES 150K OHM 5% 0402
R230	0613952R26	CER CHIP RES 110K OHM 5% 0402
R243	0613952Q79	CER CHIP RES 1800 OHM 5% 0402
R244	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R245	0613952Q77	CER CHIP RES 1500 OHM 5% 0402
R246	0613952R25	CER CHIP RES 100K OHM 5% 0402
R247	0613952R30	CER CHIP RES 160K OHM 5% 0402
R248	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R253	0613952Q41	CER CHIP RES 47.0 OHM 5% 0402
R254	0613952Q57	CER CHIP RES 220 OHM 5% 0402
R255	0613952Z46	RES,MF,3.9KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R261	0613952R14	CER CHIP RES 36K OHM 5% 0402
R262	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R263	0613952Q36	CER CHIP RES 30.0 OHM 5% 0402
R264	0613952Q57	CER CHIP RES 220 OHM 5% 0402
R270	0613952Q31	CER CHIP RES 18.0 OHM 5% 0402
R271	0613952Q95	CER CHIP RES 8200 OHM 5% 0402
R272	0613952Q96	CER CHIP RES 9100 OHM 5% 0402

Circuit Ref	Motorola Part No.	Description
R273	0613952Q60	CER CHIP RES 300 OHM 5% 0402
R274	0613952Q37	CER CHIP RES 33.0 OHM 5% 0402
R275	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R276	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R280	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R281	0613952Q96	CER CHIP RES 9100 OHM 5% 0402
R282	0613952Q70	CER CHIP RES 750 OHM 5% 0402
R283	0613952Q55	CER CHIP RES 180 OHM 5% 0402
R284	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R286	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R310	0613952R25	CER CHIP RES 100K OHM 5% 0402
R311	0613952R25	CER CHIP RES 100K OHM 5% 0402
R312	0613952R08	CER CHIP RES 20K OHM 5% 0402
R313	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R320	0613952Z80	RES,MF,330KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R321	0613952P30	CER CHIP RES 200K OHM 1% 0402
R322	0613952R25	CER CHIP RES 100K OHM 5% 0402
R400	NOT PLACED	64AM DUMMY PART NUMBER
R401	0613952R36	CER CHIP RES 300K OHM 5% 0402
R402	0613952R01	CER CHIP RES 10K OHM 5% 0402
R403	0613952R01	CER CHIP RES 10K OHM 5% 0402
R404	0613952R18	CER CHIP RES 51K OHM 5% 0402
R405	0613952R36	CER CHIP RES 300K OHM 5% 0402
R406	0613952R33	CER CHIP RES 220K OHM 5% 0402
R407	0613952R25	CER CHIP RES 100K OHM 5% 0402
R408	0613952R25	CER CHIP RES 100K OHM 5% 0402
R409	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R410	0613952R01	CER CHIP RES 10K OHM 5% 0402
R411	0613952Q71	CER CHIP RES 820 OHM 5% 0402
R412	0613952R25	CER CHIP RES 100K OHM 5% 0402
R413	0613952R25	CER CHIP RES 100K OHM 5% 0402
R414	0613952R13	CER CHIP RES 33K OHM 5% 0402
R415	0613952R13	CER CHIP RES 33K OHM 5% 0402
R416	0613952R08	CER CHIP RES 20K OHM 5% 0402
R417	0613952R01	CER CHIP RES 10K OHM 5% 0402
R418	0613952R25	CER CHIP RES 100K OHM 5% 0402
R419	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R420	0613952P30	CER CHIP RES 200K OHM 1% 0402
R421	0613952P01	CER CHIP RES 100K OHM 1% 0402
R422	0613952R25	CER CHIP RES 100K OHM 5% 0402
R423	0613952R25	CER CHIP RES 100K OHM 5% 0402
R424	0613952P30	CER CHIP RES 200K OHM 1% 0402
R425	0613952P01	CER CHIP RES 100K OHM 1% 0402
R430	0613952R25	CER CHIP RES 100K OHM 5% 0402
R431	NOT PLACED	64AM DUMMY PART NUMBER
R432	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R433	0613952R25	CER CHIP RES 100K OHM 5% 0402
R434	NOT PLACED	64AM DUMMY PART NUMBER
R440	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R441	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R442	0613952H57	CER CHIP RES 220 OHM 5% 0603
R443	0613952H51	CER CHIP RES 120 OHM 5% 0603
R445	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R446	0613952R01	CER CHIP RES 10K OHM 5% 0402
R451	0613952R17	CER CHIP RES 47K OHM 5% 0402
R460	0613952R10	CER CHIP RES 24K OHM 5% 0402
R462	0613952R10	CER CHIP RES 24K OHM 5% 0402
R463	0613952R10	CER CHIP RES 24K OHM 5% 0402
R464	0613952R12	CER CHIP RES 30K OHM 5% 0402
R469	0613952Q25	CER CHIP RES 10.0 OHM 5% 0402
R470	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R471	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R472	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R473	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R474	0613952H61	CER CHIP RES 330 OHM 5% 0603
R475	0613952R31	CER CHIP RES 180K OHM 5% 0402
R476	0613952R25	CER CHIP RES 100K OHM 5% 0402
R477	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R478	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R479	0613952R25	CER CHIP RES 100K OHM 5% 0402
R480	0613952G67	CER CHIP RES 0.0 +/-0.050 OHM
R481	NOT PLACED	64AM DUMMY PART NUMBER
R482	NOT PLACED	64AM DUMMY PART NUMBER
R483	NOT PLACED	64AM DUMMY PART NUMBER
R484	NOT PLACED	64AM DUMMY PART NUMBER
R485	NOT PLACED	64AM DUMMY PART NUMBER
R486	NOT PLACED	64AM DUMMY PART NUMBER
R487	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R488	0613952R37	CER CHIP RES 330K OHM 5% 0402
R489	NOT PLACED	64AM DUMMY PART NUMBER
R490	NOT PLACED	64AM DUMMY PART NUMBER
R491	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R492	0613952R10	CER CHIP RES 24K OHM 5% 0402
R493	0613952R37	CER CHIP RES 330K OHM 5% 0402
R494	0613952Z80	RES,MF,330KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R495	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R496	NOT PLACED	64AM DUMMY PART NUMBER
R497	NOT PLACED	64AM DUMMY PART NUMBER
R498	NOT PLACED	64AM DUMMY PART NUMBER
R499	NOT PLACED	64AM DUMMY PART NUMBER
R501	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R502	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R503	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R504	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R505	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R506	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R507	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R508	0613952R25	CER CHIP RES 100K OHM 5% 0402
R509	0613952R25	CER CHIP RES 100K OHM 5% 0402
R510	0613952R37	CER CHIP RES 330K OHM 5% 0402

Circuit Ref	Motorola Part No.	Description
R511	0613952R25	CER CHIP RES 100K OHM 5% 0402
R512	0613952R29	CER CHIP RES 150K OHM 5% 0402
R513	NOT PLACED	64AM DUMMY PART NUMBER
R514	0613952R25	CER CHIP RES 100K OHM 5% 0402
R515	NOT PLACED	64AM DUMMY PART NUMBER
R516	NOT PLACED	64AM DUMMY PART NUMBER
R517	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R518	0613952R33	CER CHIP RES 220K OHM 5% 0402
R519	0613952R25	CER CHIP RES 100K OHM 5% 0402
R520	0613952R25	CER CHIP RES 100K OHM 5% 0402
R521	NOT PLACED	64AM DUMMY PART NUMBER
R522	0613952R25	CER CHIP RES 100K OHM 5% 0402
R523	0613952R01	CER CHIP RES 10K OHM 5% 0402
R524	0613952R01	CER CHIP RES 10K OHM 5% 0402
R525	0613952R01	CER CHIP RES 10K OHM 5% 0402
R526	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
S440	4080710Z26	SWITCH, FREQUENCY (EPP)
S441	4070354A01	LIGHT TOUCH SWITCH-SMD
S442	4070354A01	LIGHT TOUCH SWITCH-SMD
S443	4070354A01	LIGHT TOUCH SWITCH-SMD
S444	1880619Z06	POTENTIOMETER, VOLUME
SH1	2686421Z02	SHIELD, FE, ELP
SH40	2686419Z02	SHIELD, MIXER, ELP
SH50	2686423Z02	SHIELD, 19 X 19 X 3.03 MM
SH52	2686424Z02	SHIELD, IF, ELP
SH100	2686418Z03	SHEILD, HARMONIC FILTER, ELP
SH200	2686424Z02	SHIELD, IF, ELP
SH201	2686423Z02	SHIELD, 19 X 19 X 3.03 MM
SH250	2686425Z02	SHIELD
SH251	2686425Z02	SHIELD
SH253	2686422Z02	SHIELD, BUFFER, ELP
SH400	2686420Z04	SHIELD, CONTROL, ELP
SH401	2686420Z03	SHIELD,CONTROL,ELP
SP7	1088791Y02	SOLDER PELLETS, LEAD FREE
T41	2515121H01	BALUN, TRANSFORMER W18 COMP
T42	2515121H01	BALUN, TRANSFORMER W18 COMP
U51	5115281H01	FM IF IC SA616 FROM PHILIPS
U52	5115070H01	IC 3-INV LMOS TC7W04FU
U110	0186438Z04	ASSY,AMP
U150	5114005A01	IC,OP AMP,2PER PKG,GP, SM,SO-8,PB-FREE
U151	2415954H02	INDUCTOR BEAD CHIP EPP WITH EPOXY
U201	5185177Y01	IC TESTED AT25016 48 PIN W18
U251	5171121L01	CUSTOM LOW VOLTAGE VCO BUFFER IC
U310	5115746H01	VOLTAGE REGULATOR, 5V
U320	5115679H01	IC VOLTAGE REGLTR LP2986
U330	5115745H01	VOLTAGE REGULATOR, 3V
U401	5185143E03	HC11FL0 (3V) ASIC MICRO-P
U402	5116648H01	128KBIT SERIAL SPI BUS EEPROM
U403	NOT PLACED	64AM DUMMY PART NUMBER
U404	51012084002	IC FLASH 4MBIT 3.3V 8MM14MM
U425	5115697H01	LOW PWR OP AMP W/RAIL TO RAIL
U451	5115062H01	IC ASFIC_CMP
U480	NOT PLACED	64AM DUMMY PART NUMBER
U490	5116029H01	1 W BTL AUDIO AMPLIFIER
U510	5114005A01	IC,OP AMP,2PER PKG,GP, SM,SO-8,PB-FREE
U511	4815066H01	UMG5N DIGITAL TRANSISTOR
VR110	4813977A59	DIODE,ZEN,MM3Z3V9,SM,SOD-323,3.9V,10MA,.2W,ZEN,PB-FREE
VR301	4813977M29	DIODE,VREF,MBZ5250,SM,SOT-23,20V,.225W,ZEN
VR302	4813977M29	DIODE,VREF,MBZ5250,SM,SOT-23,20V,.225W,ZEN
VR471	4813977M14	DIODE,ZEN,MBZ5235,SM,SOT-23,6.8V,10MA,.225W,ZEN,PB-FREE
VR472	4813977M05	DIODE,ZEN,MBZ5226,SM,SOT-23,3.3V,10MA,.225W,ZEN,PB-FREE
VR473	4813977M29	DIODE,VREF,MBZ5250,SM,SOT-23,20V,.225W,ZEN
VR474	4813977M29	DIODE,VREF,MBZ5250,SM,SOT-23,20V,.225W,ZEN
VR475	4813977M24	DIODE,ZEN,MBZ5245,SM,SOT-23,15V,10MA,.225W,ZEN,PB-FREE
Y51	4802245J84	XTAL 44.395MHZ, 3RD OT, SMD
Y70	9186145B02	CER.DISCR. CDBCA455CX36-TC
Y201	4880114R08	CRYSTAL, QUARTZ 16.8 MHZ
Y202	NOT PLACED	64AM DUMMY PART NUMBER

Notes

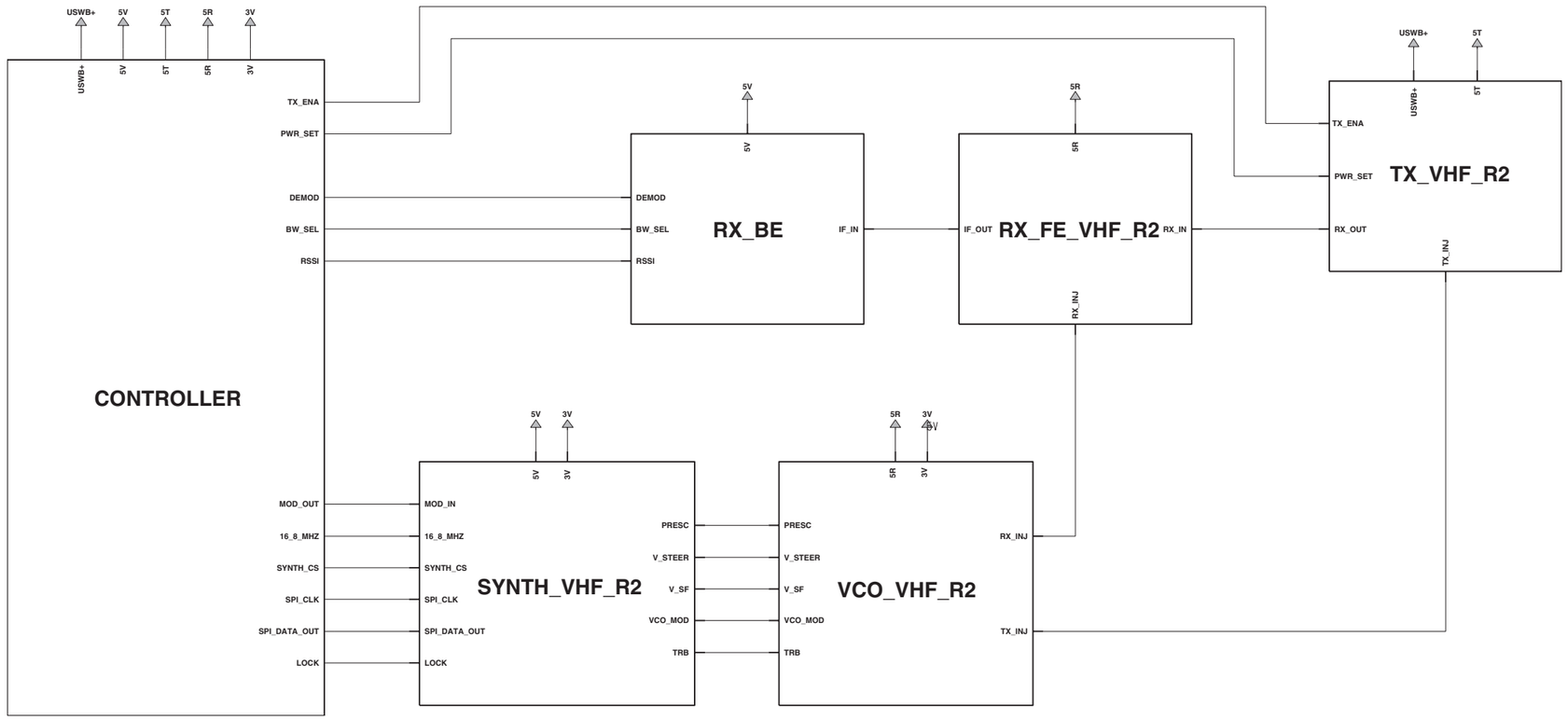


Figure 7-50. VHF (146–174 MHz) Radio Circuit Block Interconnect Diagram (8486342Z09-A)

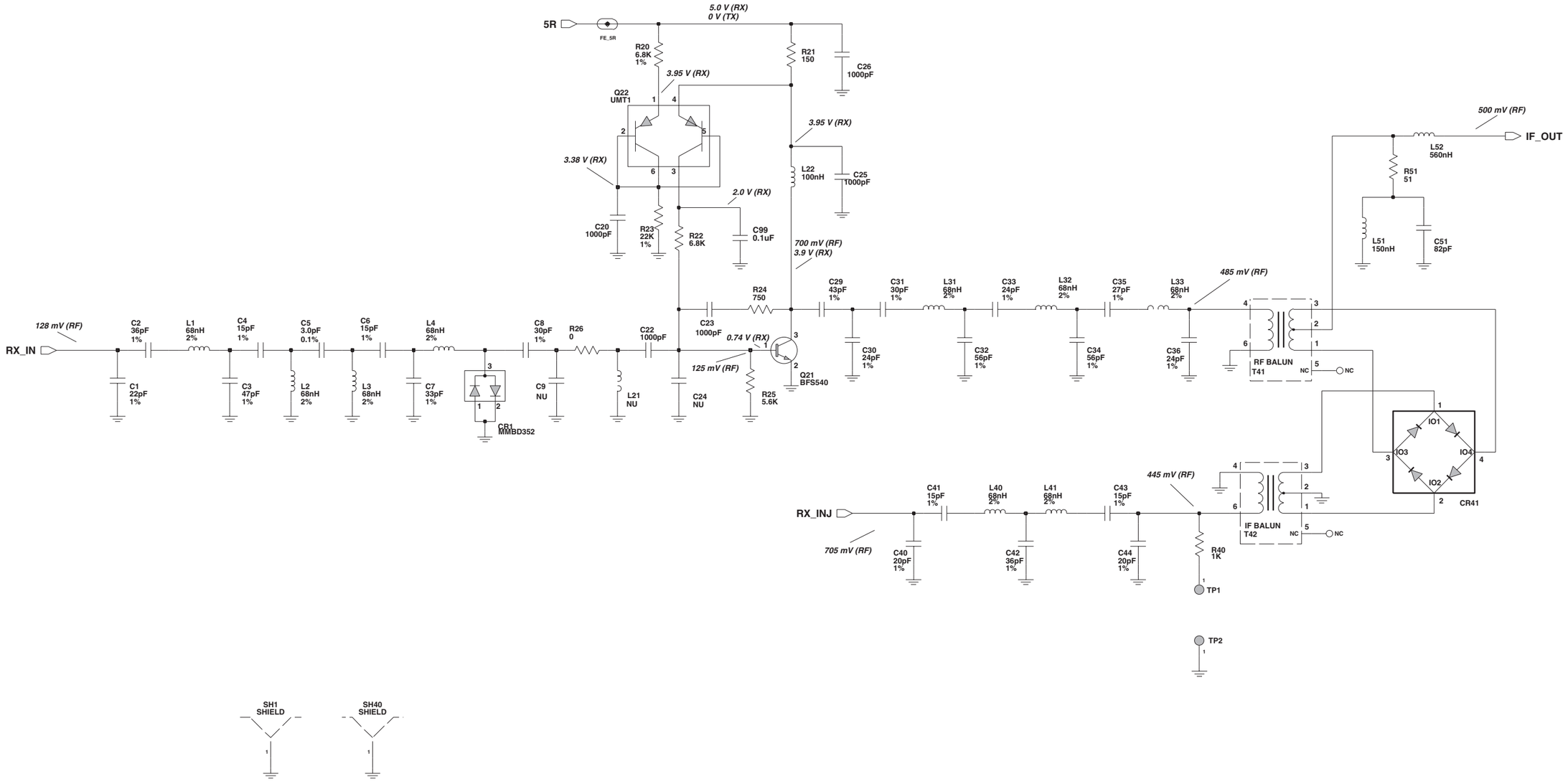


Figure 7-51. VHF (146–174 MHz) Receiver Front End Schematic Diagram (8486342Z09-A)

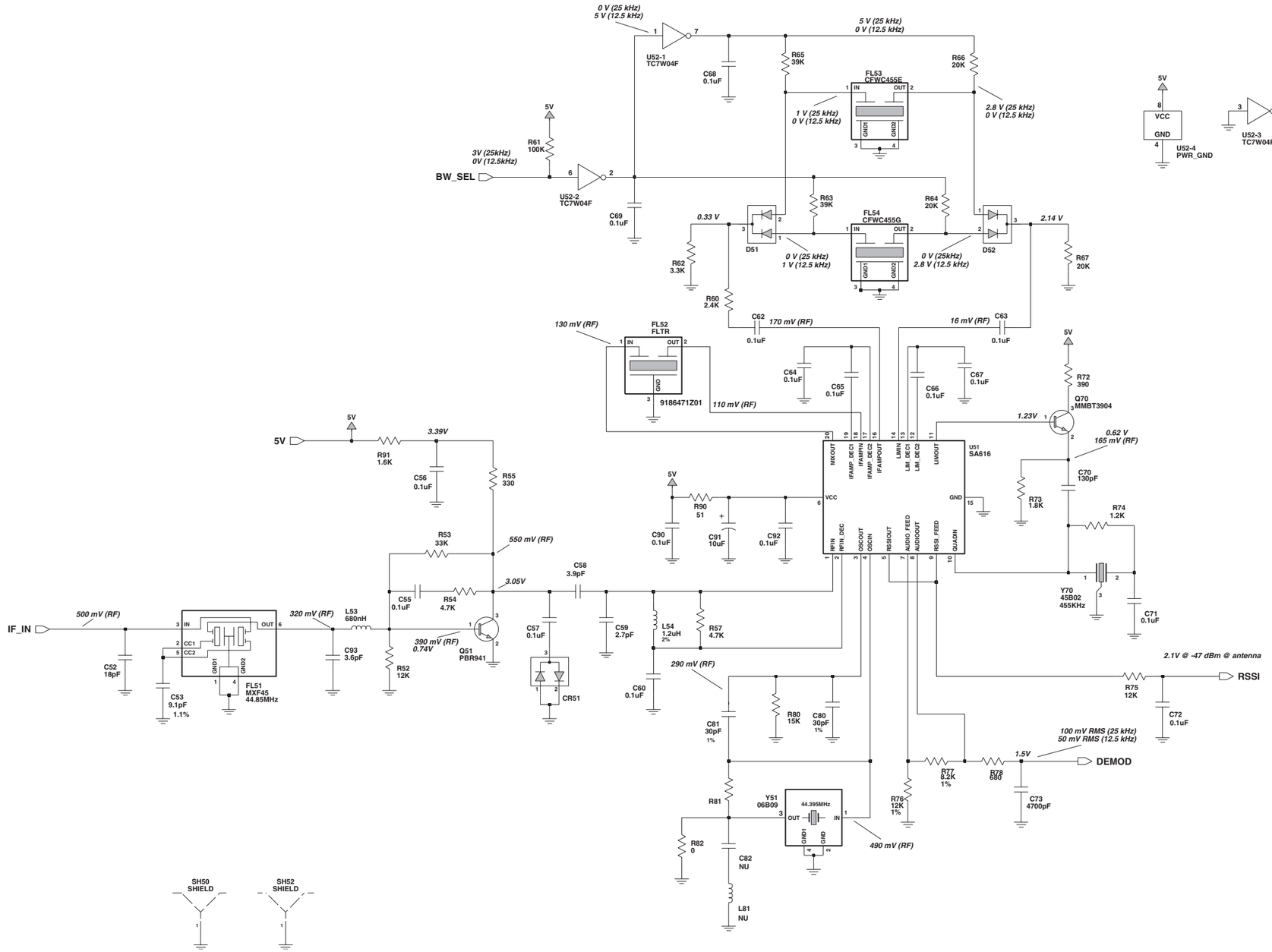


Figure 7-52. VHF (146–174 MHz) Receiver Back End Schematic Diagram (8486342Z09-A)

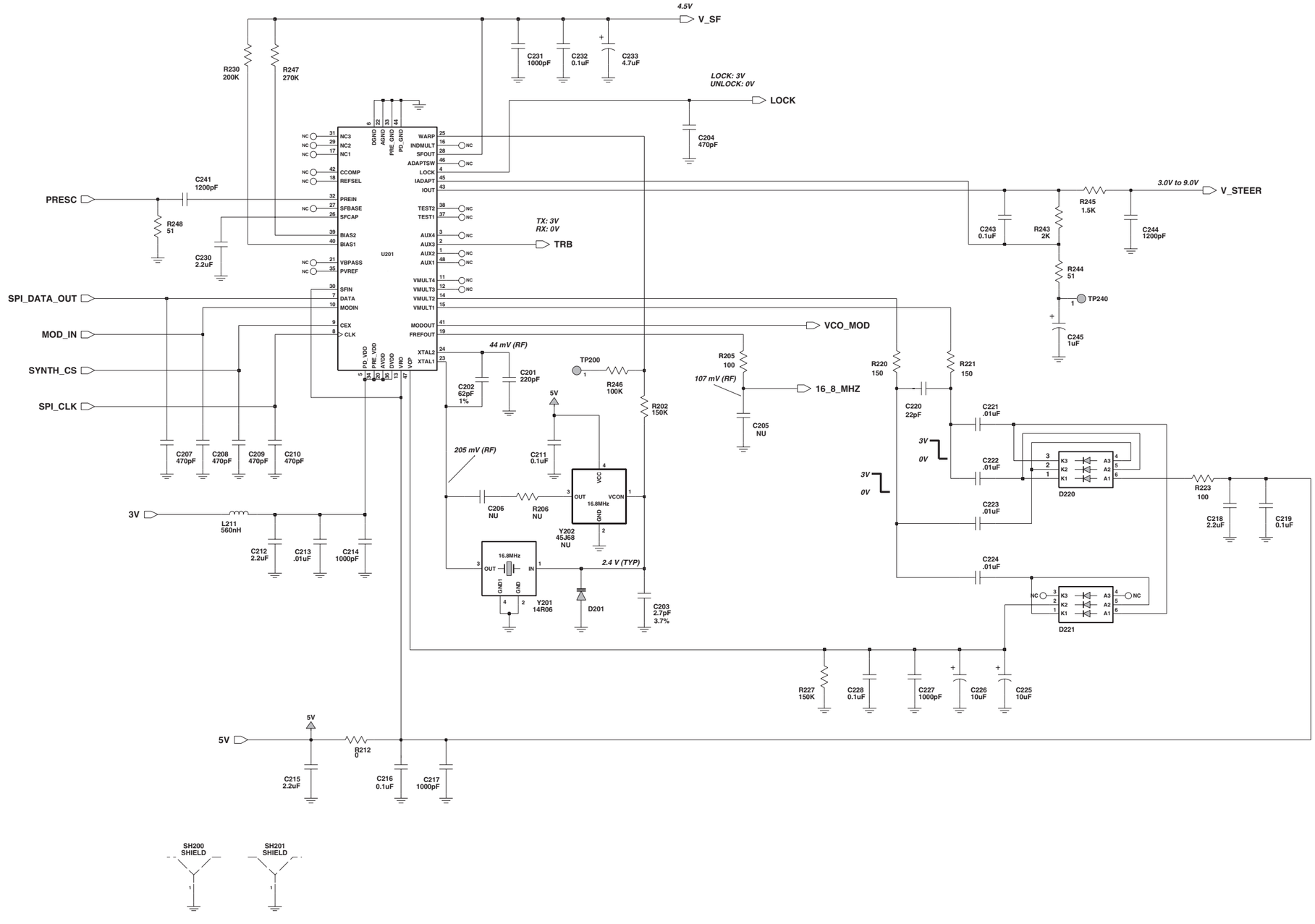


Figure 7-53. VHF (146–174 MHz) Synthesizer Schematic Diagram (8486342Z09-A)

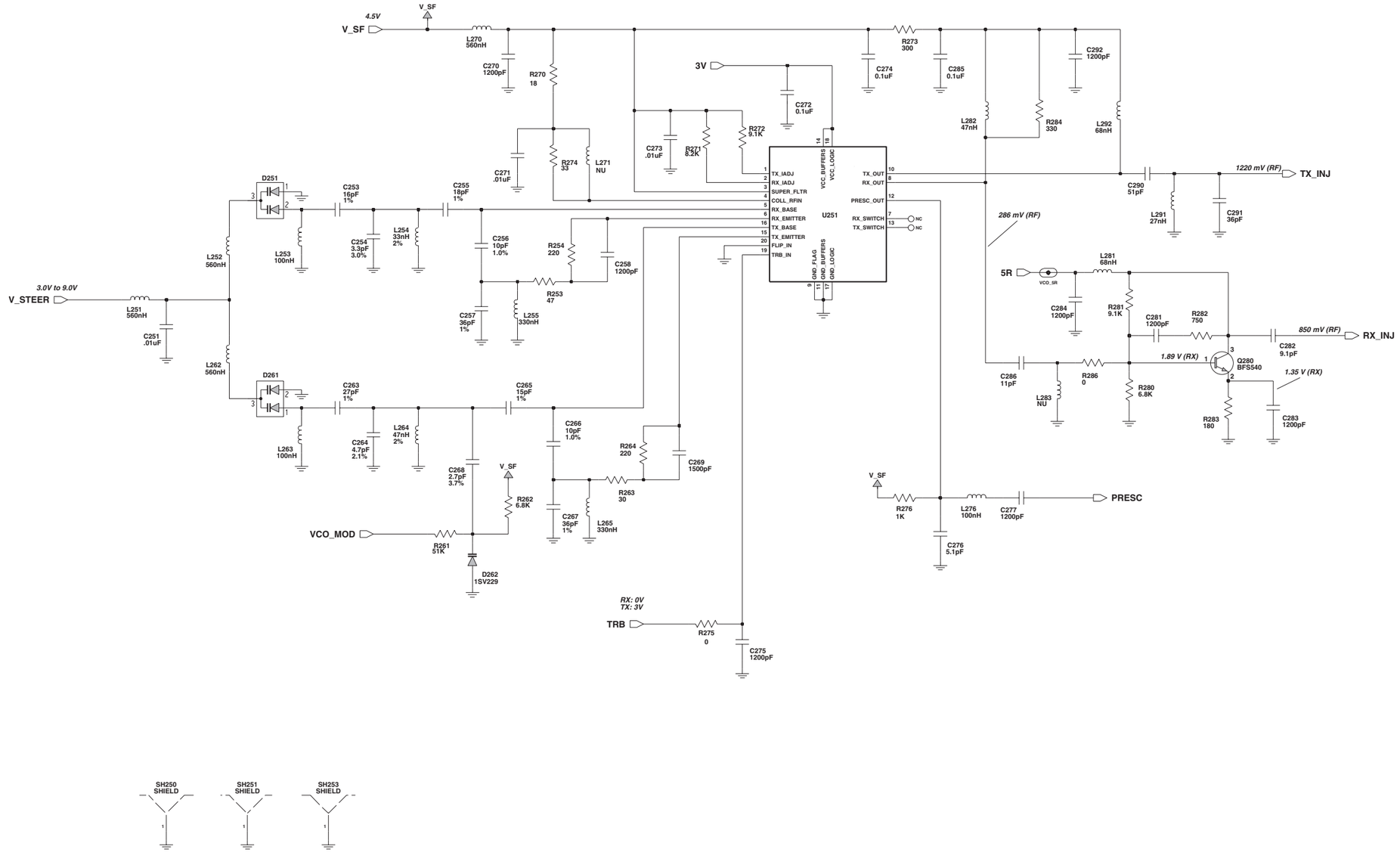


Figure 7-54. VHF (146–174 MHz) Voltage Controlled Oscillator Schematic Diagram (8486342Z09-A)

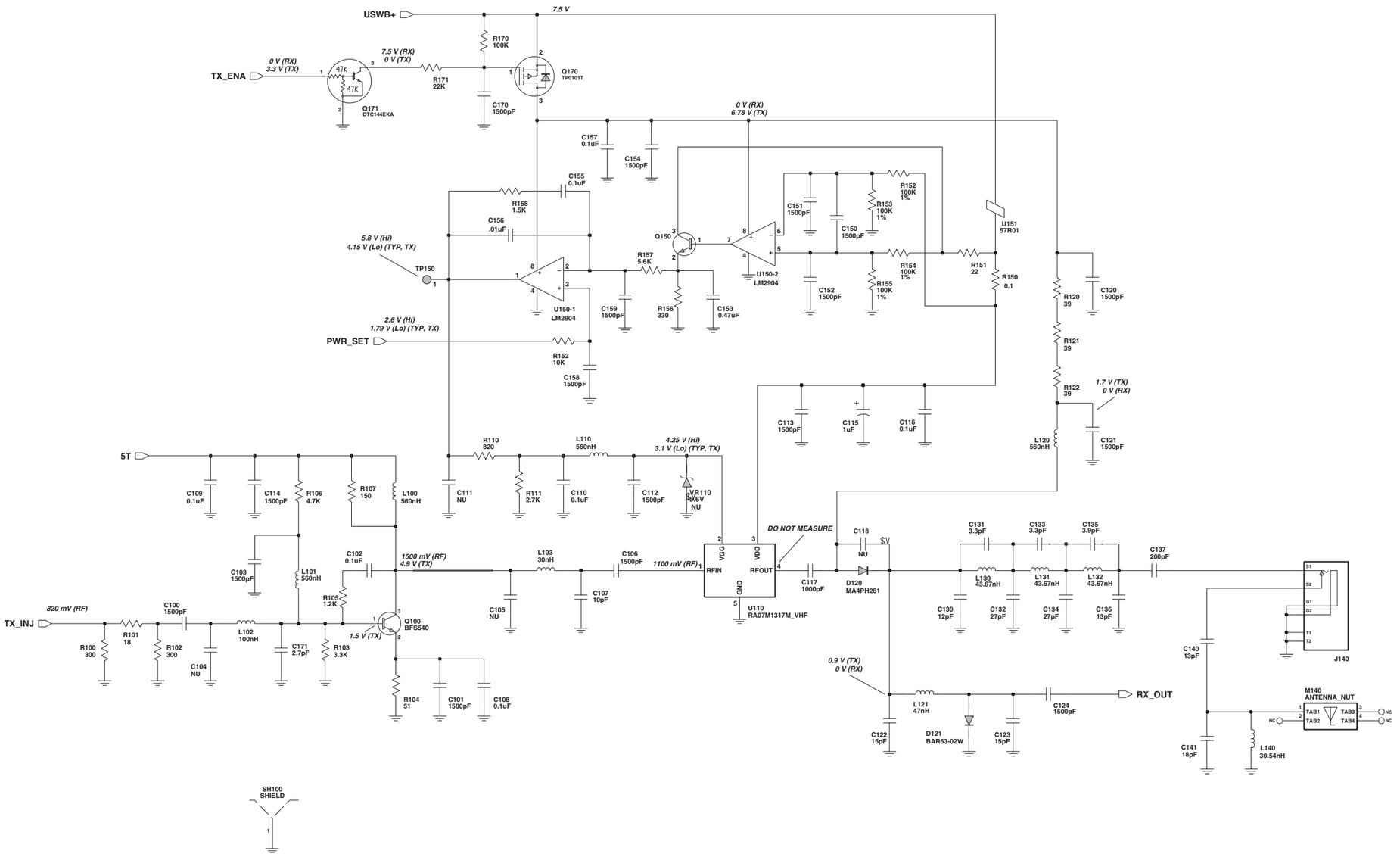


Figure 7-55. VHF (146–174 MHz) Transmitter and Power Control Schematic Diagram (8486342Z09-A)

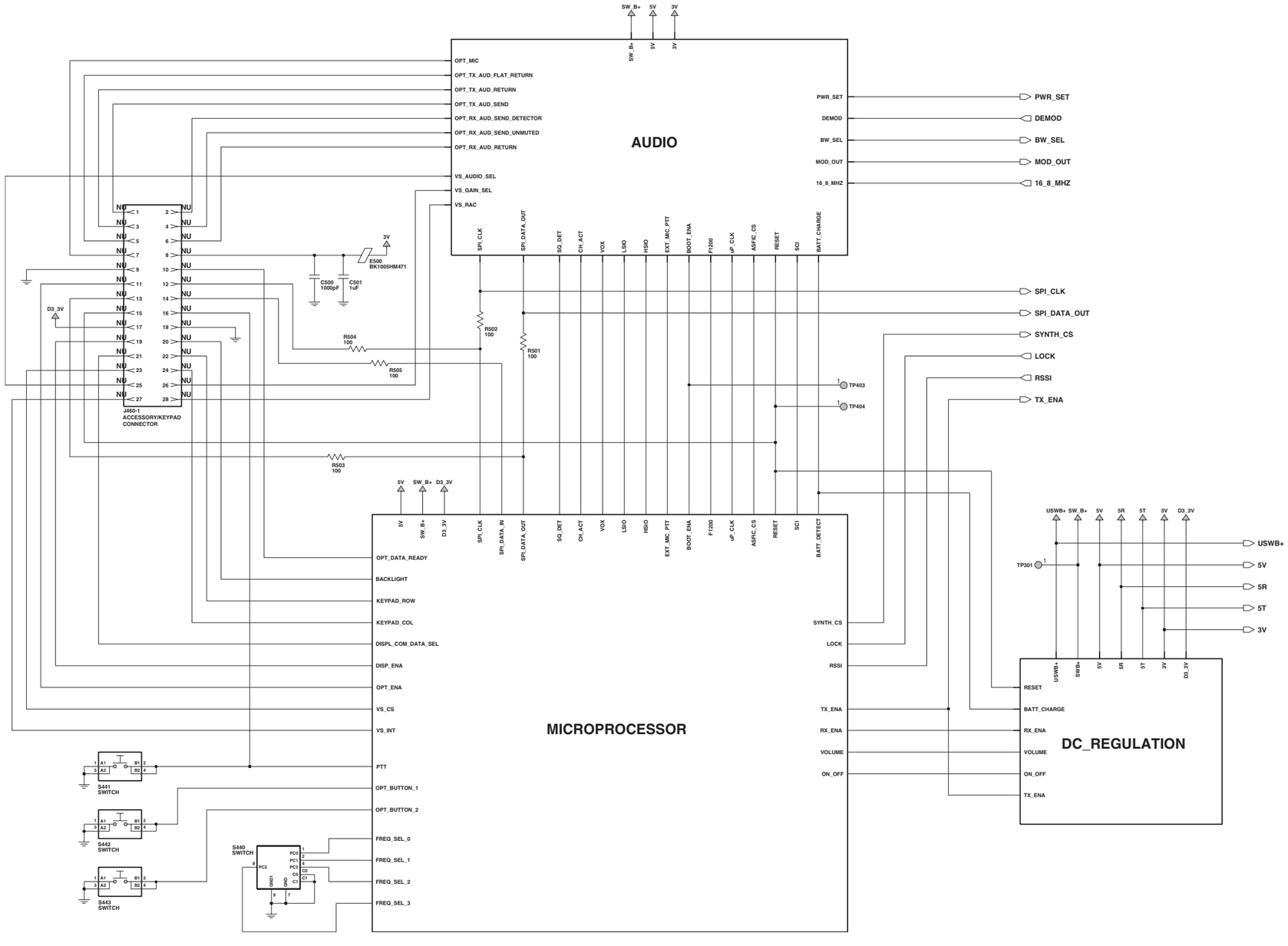


Figure 7-56. VHF (146–174 MHz) Controller Interconnect Schematic Diagram (8486342Z09-A)

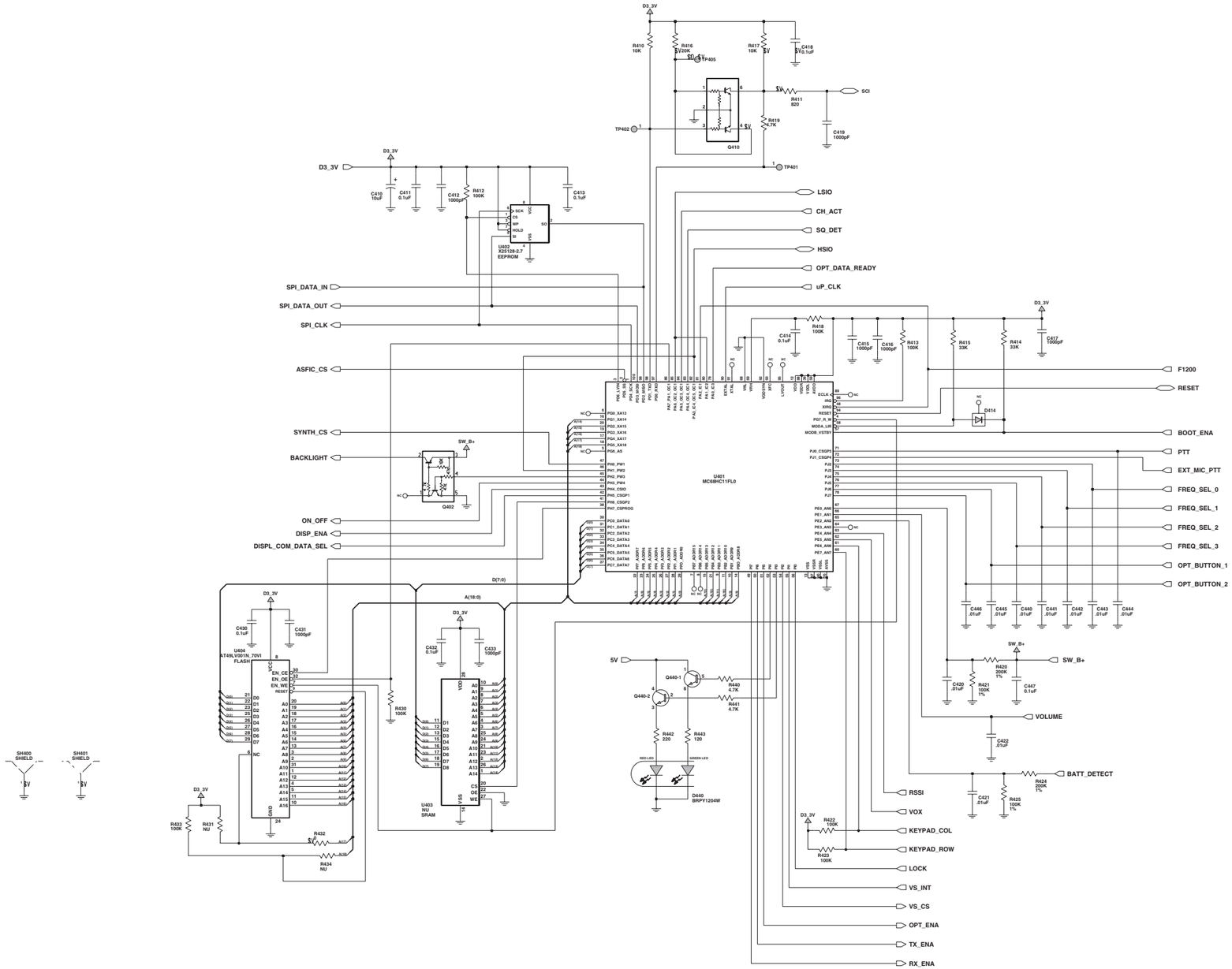


Figure 7-57. VHF (146–174 MHz) Microprocessor Circuitry Schematic Diagram (8486342Z09-A)

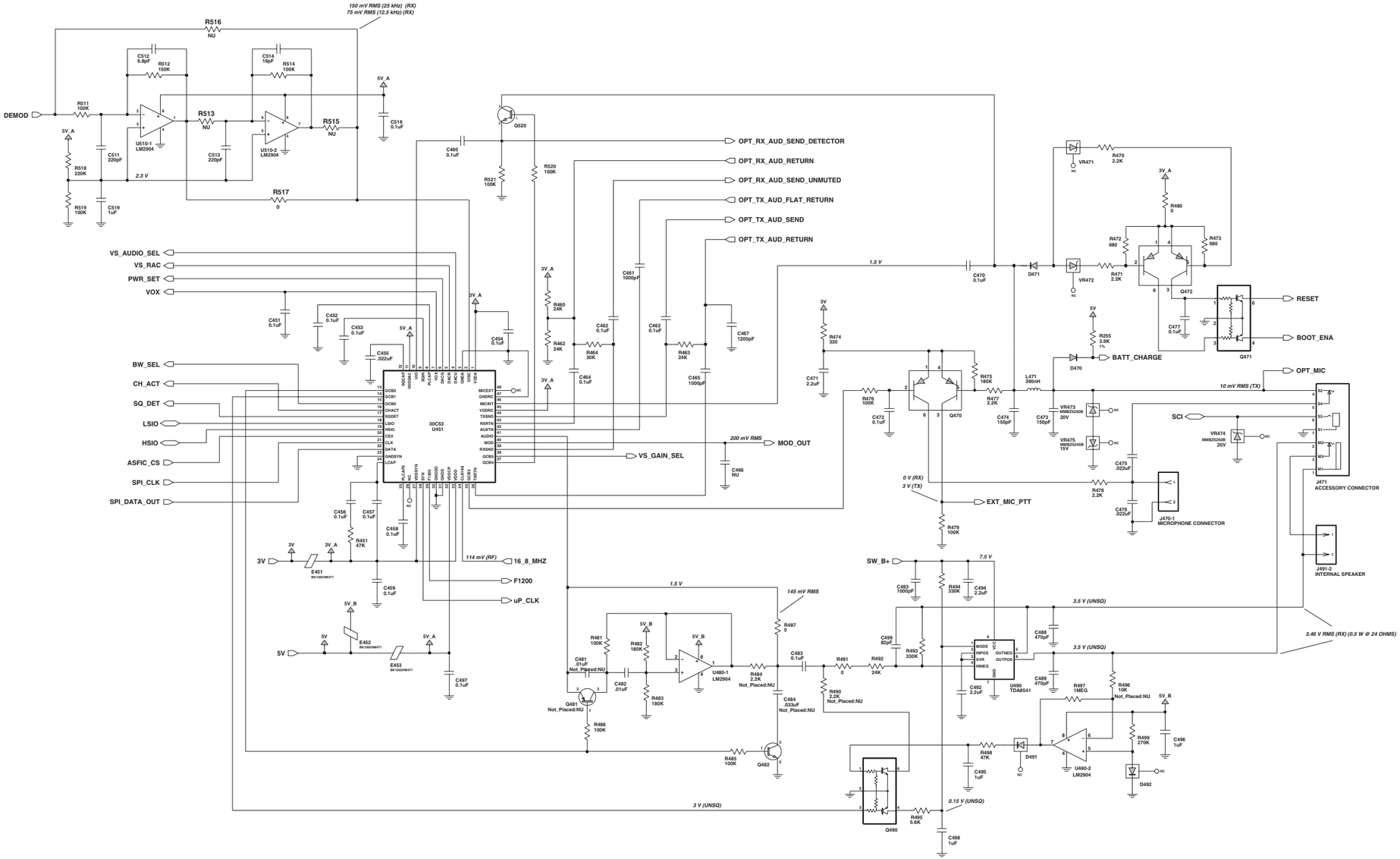


Figure 7-58. VHF (146–174 MHz) Audio Circuitry Schematic Diagram (8486342Z09-A)

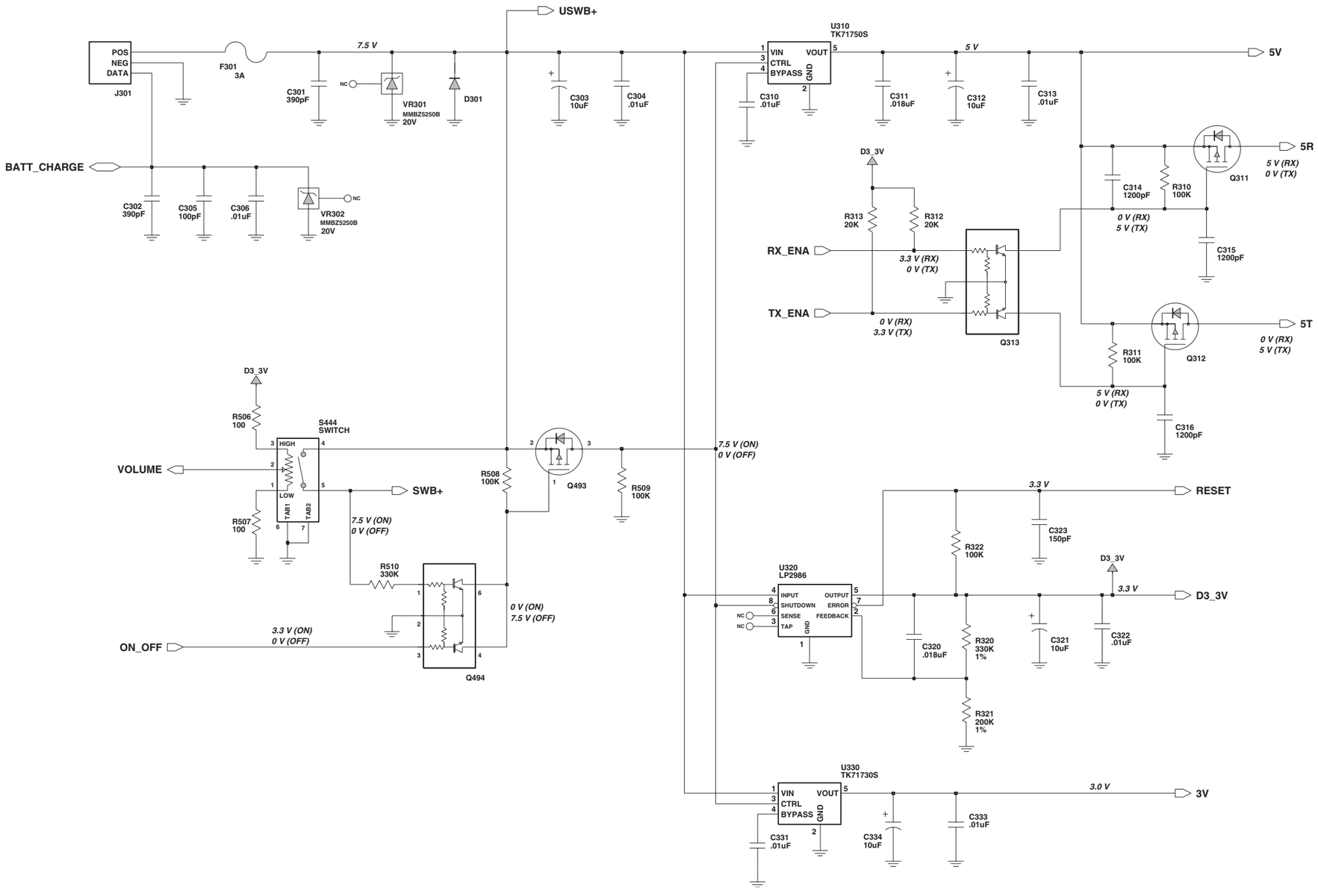


Figure 7-59. VHF (146–174 MHz) DC Regulation Schematic Diagram (8486342Z09-A)

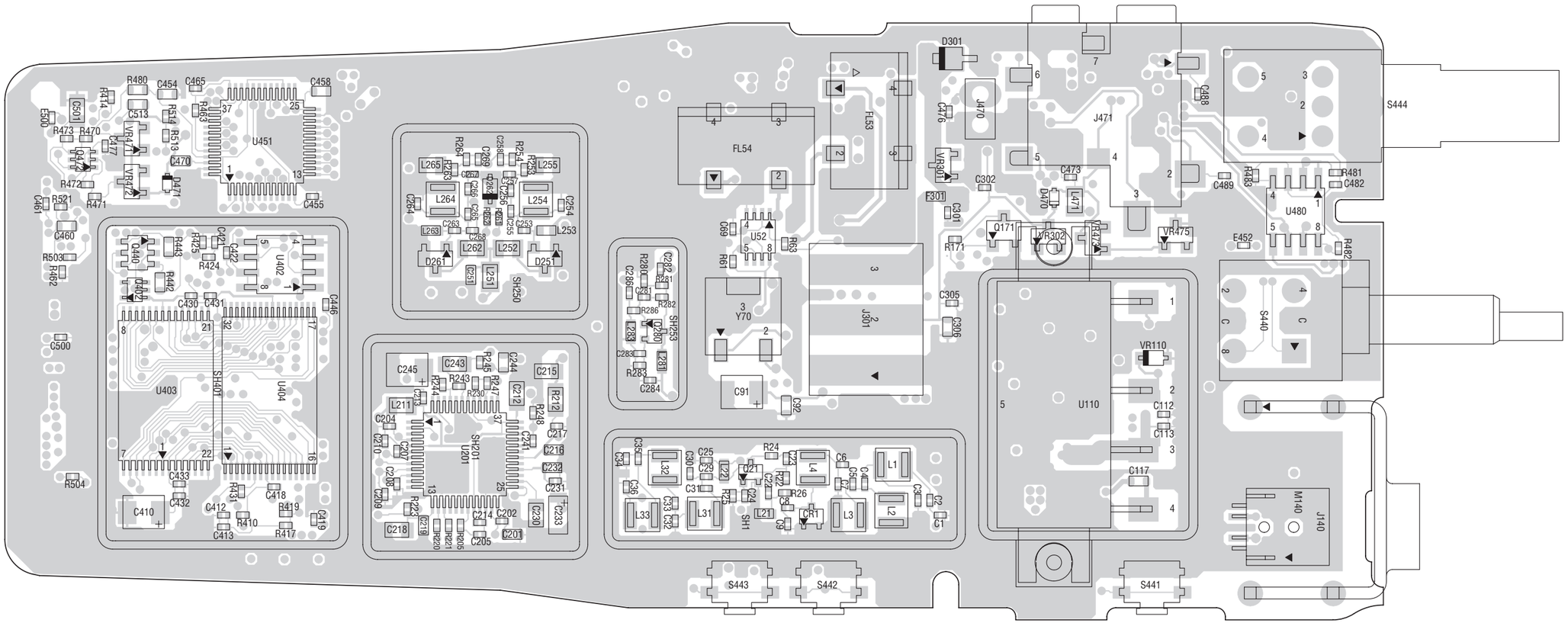


Figure 7-60. VHF (146–174 MHz) Board Component Side View (8486342Z09-A)

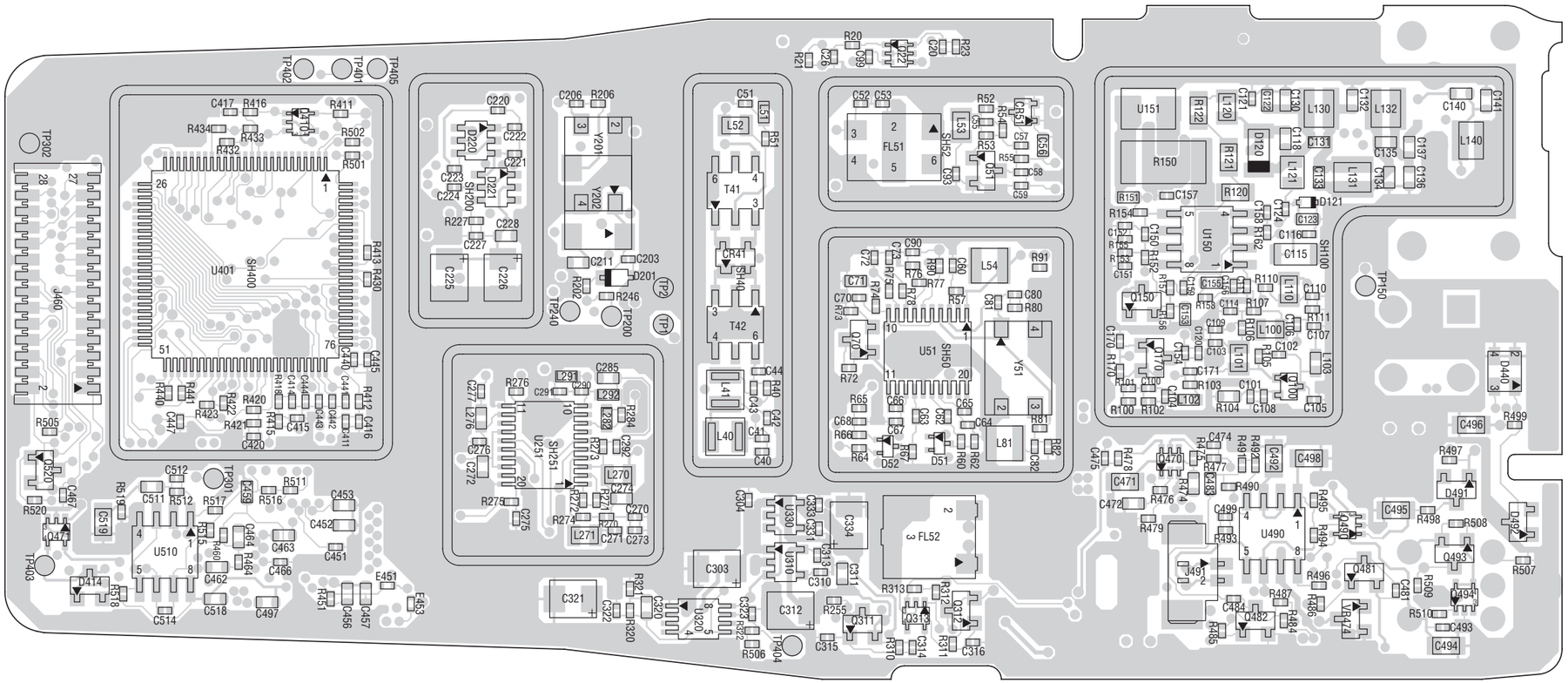


Figure 7-61. VHF (146–174 MHz) Board Solder Side View (8486342Z09-A)

VHF (146–174 MHz) Radio Parts List (8486342Z09-A)

Circuit Ref	Motorola Part No.	Description
C1	2109445U41	22 pF
C2	2109445U46	36 pF
C3	2109445U49	47 pF
C4	2109445U37	15 pF
C5	2109445U14	3.0 pF
C6	2109445U37	15 pF
C7	2109445U45	33 pF
C8	2109445U44	30 pF
C9	NOT PLACED	64AM DUMMY PART NUMBER
C20	2113743L17	1000 pF
C22	2113743L17	1000 pF
C23	2113743L17	1000 pF
C24	NOT PLACED	64AM DUMMY PART NUMBER
C25	2113743L17	1000 pF
C26	2113743L17	1000 pF
C29	2109445U48	43 pF
C30	2109445U42	24 pF
C31	2109445U44	30 pF
C32	2109445U51	56 pF
C33	2109445U42	24 pF
C34	2109445U51	56 pF
C35	2109445U43	27 pF
C36	2109445U42	24 pF
C40	2109445U40	20 pF
C41	2109445U37	15 pF
C42	2109445U46	36 pF
C43	2109445U37	15 pF
C44	2109445U40	20 pF
C51	2113743N48	82 pF
C52	2113743N32	18 pF
C53	2109445U26	9.1 pF
C55	2113743M24	0.1 uF
C56	2113743E20	0.1 uF
C57	2113743M24	0.1 uF
C58	2113743N16	3.9 pF
C59	2113743N12	2.7 pF
C60	2113743M24	0.1 uF
C62	2113743M24	0.1 uF
C63	2113743M24	0.1 uF
C64	2113743M24	0.1 uF
C65	2113743M24	0.1 uF
C66	2113743M24	0.1 uF
C67	2113743M24	0.1 uF
C68	2113743M24	0.1 uF
C69	2113743M24	0.1 uF
C70	2113743N53	130 pF
C71	2113743E20	0.1 uF
C72	2113743M24	0.1 uF
C73	2113743L33	4700 pF
C80	2109445U44	30 pF
C81	2109445U44	30 pF
C82	NOT PLACED	64AM DUMMY PART NUMBER
C90	2113743M24	0.1 uF
C91	2311049A57	10 uF
C92	2113743E20	0.1 uF
C93	2113743N15	3.6 pF
C99	2113743M24	0.1 uF
C100	2113743L21	1500 pF
C101	2113743L21	1500 pF
C102	2113743M24	0.1 uF
C103	2113743L21	1500 pF
C104	NOT PLACED	64AM DUMMY PART NUMBER
C105	NOT PLACED	64AM DUMMY PART NUMBER
C106	2113743L21	1500 pF
C107	2113743N26	10 pF
C108	2113743M24	0.1 uF
C109	2113743M24	0.1 uF
C110	2113743M24	0.1 uF
C111	NOT PLACED	64AM DUMMY PART NUMBER
C112	2113743L21	1500 pF
C113	2113743L21	1500 pF
C114	2113743L21	1500 pF
C115	2311049A07	1 uF
C116	2113743M24	0.1 uF
C117	2113741F25	1000 pF
C118	NOT PLACED	64AM DUMMY PART NUMBER
C120	2113743L21	1500 pF
C121	2113743L21	1500 pF
C122	2113740F31	15 pF
C123	2113740F31	15 pF
C124	2113743L21	1500 pF
C130	2113740F29	12 pF
C131	2113740F15	3.3 pF
C132	2113740F37	27 pF
C133	2113740F15	3.3 pF
C134	2113740F37	27 pF
C135	2113740F17	3.9 pF
C136	2113740F30	13 pF
C137	2113740F58	200 pF
C140	2113740F30	13 pF
C141	2113740F33	18 pF
C150	2113743L21	1500 pF
C151	2113743L21	1500 pF
C152	2113743L21	1500 pF
C153	2113743K18	0.47 uF
C154	2113743L21	1500 pF
C155	2113743E20	0.1 uF
C156	2113743L41	.01 uF
C157	2113743M24	0.1 uF
C158	2113743L21	1500 pF
C159	2113743L21	1500 pF
C170	2113743L21	1500 pF
C171	2113743N12	2.7 pF
C201	2113740F59	220 pF
C202	2109445U52	62 pF
C203	2109445U13	2.7 pF
C204	2113743L09	470 pF
C205	NOT PLACED	64AM DUMMY PART NUMBER
C206	NOT PLACED	64AM DUMMY PART NUMBER
C207	2113743L09	470 pF
C208	2113743L09	470 pF
C209	2113743L09	470 pF
C210	2113743L09	470 pF
C211	2113743E20	0.1 uF
C212	2113743F18	2.2 uF
C213	2113743L41	.01 uF
C214	2113743L17	1000 pF
C215	2113743F18	2.2 uF
C216	2113743E20	0.1 uF
C217	2113743L17	1000 pF
C218	2113743F18	2.2 uF
C219	2113743E20	0.1 uF
C220	2113743N34	22 pF
C221	2113743L41	.01 uF
C222	2113743L41	.01 uF
C223	2113743L41	.01 uF
C224	2113743L41	.01 uF
C225	2311049A57	10 uF
C226	2311049A57	10 uF
C227	2113743L17	1000 pF
C228	2113743E20	0.1 uF
C230	2113743F18	2.2 uF
C231	2113743L17	1000 pF
C232	2113743E20	0.1 uF
C233	2311049A56	4.7 uF
C241	2113743L19	1200 pF
C243	2113741M69	0.1 uF
C244	2113741F27	1200 pF
C245	2311049A08	1 uF
C251	2113741F49	.01 uF
C253	2109445U38	16 pF
C254	2109445U15	3.3 pF
C255	2109445U39	18 pF
C256	2109445U27	10 pF
C257	2109445U46	36 pF
C258	2113743L19	1200 pF
C263	2109445U43	27 pF
C264	2109445U19	4.7 pF
C265	2109445U37	15 pF
C266	2109445U27	10 pF
C267	2109445U46	36 pF
C268	2109445U13	2.7 pF
C269	2113743L21	1500 pF
C270	2113743L19	1200 pF
C271	2113743L41	.01 uF
C272	2113743E20	0.1 uF
C273	2113743L41	.01 uF
C274	2113743E20	0.1 uF
C275	2113743L19	1200 pF
C276	2113743N19	5.1 pF
C277	2113743L19	1200 pF
C281	2113743L19	1200 pF
C282	2113743N25	9.1 pF
C283	2113743L19	1200 pF
C284	2113743L19	1200 pF
C285	2113743E20	0.1 uF
C286	2113743N27	11 pF
C290	2113743N43	51 pF
C291	2113743N39	36 pF
C292	2113743L19	1200 pF
C301	2113743L07	390 pF
C302	2113743L07	390 pF
C303	2311049A57	10 uF
C304	2113743L41	.01 uF
C305	2113743N50	100 pF
C306	2113741F49	.01 uF
C310	2113743L41	.01 uF
C311	2113743E05	.018 uF
C312	2311049A57	10 uF
C313	2113743L41	.01 uF
C314	2113743L19	1200 pF
C315	2113743L19	1200 pF
C316	2113743L19	1200 pF
C320	2113743E05	.018 uF
C321	2311049A57	10 uF
C322	2113743L41	.01 uF
C323	2113743N54	150 pF
C331	2113743L41	.01 uF
C333	2113743L41	.01 uF
C334	2311049A57	10 uF
C410	2311049A57	10 uF
C411	2113743M24	0.1 uF
C412	2113743L17	1000 pF
C413	2113743M24	0.1 uF

Circuit Ref	Motorola Part No.	Description
C414	2113743M24	0.1 uF
C415	2113743L17	1000 pF
C416	2113743L17	1000 pF
C417	2113743L17	1000 pF
C418	2113743M24	0.1 uF
C419	2113743L17	1000 pF
C420	2113743L41	.01 uF
C421	2113743L41	.01 uF
C422	2113743L41	.01 uF
C430	2113743M24	0.1 uF
C431	2113743L17	1000 pF
C432	2113743M24	0.1 uF
C433	2113743L17	1000 pF
C440	2113743L41	.01 uF
C441	2113743L41	.01 uF
C442	2113743L41	.01 uF
C443	2113743L41	.01 uF
C444	2113743L41	.01 uF
C445	2113743L41	.01 uF
C446	2113743L41	.01 uF
C447	2113743M24	0.1 uF
C451	2113743M24	0.1 uF
C452	2113743E20	0.1 uF
C453	2113743E20	0.1 uF
C454	2113743E20	0.1 uF
C455	2113743L48	.022 uF
C456	2113743E20	0.1 uF
C457	2113743E20	0.1 uF
C458	2113743E20	0.1 uF
C459	2113743E20	0.1 uF
C460	2113743E20	0.1 uF
C461	2113743L17	1000 pF
C462	2113743E20	0.1 uF
C463	2113743E20	0.1 uF
C464	2113743E20	0.1 uF
C465	2113743L17	1000 pF
C466	NOT PLACED	64AM DUMMY PART NUMBER
C467	2113743L19	1200 pF
C470	2113743E20	0.1 uF
C471	2113743F18	2.2 uF
C472	2113743E20	0.1 uF
C473	2113743N54	150 pF
C474	2113743N54	150 pF
C475	2113743L48	.022 uF
C476	2113743L48	.022 uF
C477	2113743M24	0.1 uF
C481	NOT PLACED	64AM DUMMY PART NUMBER
C482	2113743L41	.01 uF
C483	2113743E20	0.1 uF
C484	NOT PLACED	64AM DUMMY PART NUMBER
C488	2113743L09	470 pF
C489	2113743L09	470 pF
C492	2113743F18	2.2 uF
C493	2113743L17	1000 pF
C494	2113743F18	2.2 uF
C495	2113743F16	1 uF
C496	2113743F16	1 uF
C497	2113743E20	0.1 uF
C498	2113743F16	1 uF
C499	2113743N48	82 pF
C500	2113743L17	1000 pF
C501	2113743F16	1 uF
C511	2113740F59	220 pF
C512	2113743N22	6.8 pF
C513	2113740F59	220 pF
C514	2113743N31	16 pF
C518	2113743E20	0.1 uF
C519	2113743F16	1 uF
CR1	4813825A19	dual Schottky, MMBD352
CR41	4886143B01	quad ring diode, SMS3927-99
CR51	4813825A19	dual Schottky, MMBD352
D51	4802245J97	dual silicon, DAN235ETL
D52	4802245J97	dual silicon, DAN235ETL
D120	4880973Z02	silicon PIN, MA4PH261
D121	4809948D12	silicon PIN, BAR_63-02W
D201	4862824C03	varactor, 1SV232
D220	4802233J09	triple diode, IMN10
D221	4802233J09	triple diode, IMN10
D251	4805649Q13	dual varactor, 1SV228
D261	4805649Q13	dual varactor, 1SV228
D262	4862824C01	varactor, 1SV229
D301	4813833A19	silicon, reverse polarity, MBRM120ET3
D414	4805129M41	Schottky, MMBD501
D440	4805729G49	dual LED red/green, BRPY1204W
D470	4809924D18	Schottky, RB520S-30
D471	4809924D18	Schottky, RB520S-30
D491	4805129M41	Schottky, MMBD501
D492	4805129M41	Schottky, MMBD501
E451	2480640Z01	bead, BK1005HM471
E452	2480640Z01	bead, BK1005HM471
E453	2480640Z01	bead, BK1005HM471
E500	2480640Z01	bead, BK1005HM471
F301	6580542Z01	fuse, 3 amp
FL51	9180022M11	4-pole crystal filter, 44.85 MHz
FL52	9180468V05	4-pole ceramic filter, 455 kHz, CFU455E
FL53	9180469V05	6-pole ceramic filter, 455 kHz, CFWC455E
FL54	9180469V03	6-pole ceramic filter, 455 kHz, CFWC455G
J140	0986428Z01	connector, external antenna
J301	0986565Z01	battery contact assembly
J460	NOT PLACED	64AM DUMMY PART NUMBER
J470	0985818A01	connector, 2-pin, internal mic
J471	0980683Z03	connector, 2.5 / 3.5 mm, accessories
J491	0909897T04	connector, 2-pin, internal spkr
L1	2413923C09	68 nH
L2	2413923C09	68 nH
L3	2413923C09	68 nH
L4	2413923C09	68 nH
L21	NOT PLACED	64AM DUMMY PART NUMBER
L22	2413926N24	100 nH
L31	2413923C09	68 nH
L32	2413923C09	68 nH
L33	2413923C09	68 nH
L40	2413923C09	68 nH
L41	2413923C09	68 nH
L51	2413926N26	150 nH
L52	2413926K32	560 nH
L53	2413926K33	680 nH
L54	2413923A25	1.2 uH
L81	NOT PLACED	64AM DUMMY PART NUMBER
L100	2413926K32	560 nH
L101	2413926K32	560 nH
L102	2409377M17	100 nH
L103	2409377M31	30 nH
L110	2413926K32	560 nH
L120	2413926K32	560 nH
L121	2462587V30	47 nH
L130	2479990N01	43.67 nH
L131	2479990N01	43.67 nH
L132	2479990N01	43.67 nH
L140	2479990M01	30.54 nH
L211	2413926K32	560 nH
L251	2413926K32	560 nH
L252	2413926K32	560 nH
L253	2409377M17	100 nH
L254	2413923C05	33 nH
L255	2413926K29	330 nH
L262	2413926K32	560 nH
L263	2409377M17	100 nH
L264	2413923C07	47 nH
L265	2413926K29	330 nH
L270	2413926K32	560 nH
L271	NOT PLACED	64AM DUMMY PART NUMBER
L276	2413926N24	100 nH
L281	2413926N22	68 nH
L282	2413926N20	47 nH
L283	NOT PLACED	64AM DUMMY PART NUMBER
L291	2413926N17	27 nH
L292	2413926N22	68 nH
L471	2413926K30	390 nH
M140	0286427Z01	antenna nut
Q21	4802245J95	silicon NPN, BFS540
Q22	4805723X02	dual silicon PNP, UMT1
Q51	4802197J95	silicon NPN, PBR941
Q70	4880214G02	silicon NPN, MMBT3904
Q100	4802245J95	silicon NPN, BFS540
Q150	4880214G02	silicon NPN, MMBT3904
Q170	4809579E18	P-channel MOSFET, TP0101T
Q171	4880048M01	digital NPN, DTC144EKA
Q280	4802245J95	silicon NPN, BFS540
Q311	4809579E18	P-channel MOSFET, TP0101T
Q312	4809579E18	P-channel MOSFET, TP0101T
Q313	4802245J54	dual digital NPN, UMG5
Q402	4809939C05	dual digital NPN/PNP, UMC5NTL
Q410	4802245J54	dual digital NPN, UMG5
Q440	5180159R01	dual NPN, IMX1
Q470	4805723X02	dual silicon PNP, UMT1
Q471	4802245J54	dual digital NPN, UMG5
Q472	4805723X02	dual silicon PNP, UMT1
Q481	NOT PLACED	64AM DUMMY PART NUMBER
Q482	4813824A10	silicon NPN, MMBT3904
Q490	4802245J54	dual digital NPN, UMG5
Q493	4809579E18	P-channel MOSFET, TP0101T
Q494	4802245J54	dual digital NPN, UMG5
Q520	4813824A10	silicon NPN, MMBT3904
R20	0662057U97	6.8K
R21	0662057M54	150
R22	0662057M94	6.8K
R23	0662057V11	22K
R24	0662057M71	750
R25	0662057M92	5.6K
R26	0662057M01	0
R40	0662057M74	1K
R51	0662057M43	51
R52	0662057N01	12K
R53	0662057N11	33K
R54	0662057M90	4.7K
R55	0662057M62	330

Circuit Ref	Motorola Part No.	Description
R57	0662057M90	4.7K
R60	0662057M83	2.4K
R61	0662057N23	100K
R62	0662057M86	3.3K
R63	0662057N13	39K
R64	0662057N06	20K
R65	0662057N13	39K
R66	0662057N06	20K
R67	0662057N06	20K
R72	0662057M64	390
R73	0662057M80	1.8K
R74	0662057M76	1.2K
R75	0662057N01	12K
R76	0662057V04	12K
R77	0662057U99	8.2K
R78	0662057M70	680
R80	0662057N03	15K
R81	NOT PLACED	64AM DUMMY PART NUMBER
R82	0662057M01	0
R90	0662057M43	51
R91	0662057M79	1.6K
R100	0662057M61	300
R101	0662057M32	18
R102	0662057M61	300
R103	0662057M86	3.3K
R104	0662057A18	51
R105	0662057M76	1.2K
R106	0662057M90	4.7K
R107	0662057M54	150
R110	0662057M72	820
R111	0662057M84	2.7K
R120	0662057C41	39
R121	0662057C41	39
R122	0662057C41	39
R150	0680539Z01	0.1
R151	0662057A09	22
R152	0662057V27	100K
R153	0662057V27	100K
R154	0662057V27	100K
R155	0662057V27	100K
R156	0662057M62	330
R157	0662057M92	5.6K
R158	0662057M78	1.5K
R162	0662057M98	10K
R170	0662057N23	100K
R171	0662057N07	22K
R202	0662057N27	150K
R205	0662057M50	100
R206	NOT PLACED	64AM DUMMY PART NUMBER
R212	0662057C01	0
R220	0662057M54	150
R221	0662057M54	150
R223	0662057M50	100
R227	0662057N27	150K
R230	0662057N30	200K
R243	0662057M81	2K
R244	0662057M43	51
R245	0662057M78	1.5K
R246	0662057N23	100K
R247	0662057N33	270K
R248	0662057M43	51
R253	0662057M42	47
R254	0662057M58	220
R255	0662057U91	3.9K
R261	0662057N16	51K
R262	0662057M94	6.8K
R263	0662057M37	30
R264	0662057M58	220
R270	0662057M32	18
R271	0662057M96	8.2K
R272	0662057M97	9.1K
R273	0662057M61	300
R274	0662057M38	33
R275	0662057M01	0
R276	0662057M74	1K
R280	0662057M94	6.8K
R281	0662057M97	9.1K
R282	0662057M71	750
R283	0662057M56	180
R284	0662057M62	330
R286	0662057M01	0
R310	0662057N23	100K
R311	0662057N23	100K
R312	0662057N06	20K
R313	0662057N06	20K
R320	0662057V43	330K
R321	0662057V35	200K
R322	0662057N23	100K
R410	0662057M98	10K
R411	0662057M72	820
R412	0662057N23	100K
R413	0662057N23	100K
R414	0662057N11	33K
R415	0662057N11	33K
R416	0662057N06	20K
R417	0662057M98	10K
R418	0662057N23	100K
R419	0662057M90	4.7K
R420	0662057V35	200K
R421	0662057V27	100K
R422	0662057N23	100K
R423	0662057N23	100K
R424	0662057V35	200K
R425	0662057V27	100K
R430	0662057N23	100K
R431	NOT PLACED	64AM DUMMY PART NUMBER
R432	0662057M01	0
R433	0662057N23	100K
R434	NOT PLACED	64AM DUMMY PART NUMBER
R440	0662057M90	4.7K
R441	0662057M90	4.7K
R442	0662057A33	220
R443	0662057A27	120
R451	0662057N15	47K
R460	0662057N08	24K
R462	0662057N08	24K
R463	0662057N08	24K
R464	0662057N10	30K
R470	0662057M82	2.2K
R471	0662057M82	2.2K
R472	0662057M70	680
R473	0662057M70	680
R474	0662057A37	330
R475	0662057N29	180K
R476	0662057N23	100K
R477	0662057M82	2.2K
R478	0662057M82	2.2K
R479	0662057N23	100K
R480	0662057B47	0
R481	0662057N23	100K
R482	0662057N29	180K
R483	0662057N29	180K
R484	NOT PLACED	64AM DUMMY PART NUMBER
R485	0662057N23	100K
R486	0662057N23	100K
R487	0662057M01	0
R490	NOT PLACED	64AM DUMMY PART NUMBER
R491	0662057M01	0
R492	0662057N08	24K
R493	0662057N35	330K
R494	0662057V43	330K
R495	0662057M92	5.6K
R496	NOT PLACED	64AM DUMMY PART NUMBER
R497	0662057N47	1MEG
R498	0662057N15	47K
R499	0662057N33	270K
R501	0662057M50	100
R502	0662057M50	100
R503	0662057M50	100
R504	0662057M50	100
R505	0662057M50	100
R506	0662057M50	100
R507	0662057M50	100
R508	0662057N23	100K
R509	0662057N23	100K
R510	0662057N35	330K
R511	0662057N23	100K
R512	0662057N27	150K
R513	NOT PLACED	64AM DUMMY PART NUMBER
R514	0662057N23	100K
R515	NOT PLACED	64AM DUMMY PART NUMBER
R516	NOT PLACED	64AM DUMMY PART NUMBER
R517	0662057M01	0
R518	0662057N31	220K
R519	0662057N23	100K
R520	0662057N23	100K
R521	0662057N23	100K
S440	4080710Z22	switch, rotary, 16 channel select
	or 4080710Z13	switch, rotary, 4 channel select
S441	4070354A01	pushbutton switch, PTT
S442	4070354A01	pushbutton switch, side option (lower)
S443	4070354A01	pushbutton switch, side option (upper)
S444	1880619Z02	switch, rotary on-off, with 10K volume control
SH1	2686421Z01	shield, comp side, RF front end
SH40	2686419Z01	shield, solder side, first mixer
SH50	2686423Z01	shield, solder side, IFIC and 2nd LO crystal
SH52	2686424Z01	shield, solder side, high IF crystal filter
SH100	2686418Z01	shield, solder side, transmitter
SH200	2686424Z01	shield, solder side, synthesizer charge pump
SH201	2686423Z01	shield, com side, synthesizer
SH250	2686425Z01	shield, comp side, VCO tank circuits
SH251	2686425Z01	shield, solder side, VCOBIC
SH253	2686422Z01	shield, comp side, VCO RX injection buffer

Circuit Ref	Motorola Part No.	Description
SH400	2686420Z01	shield, solder side, microprocessor
SH401	2686420Z01	shield, comp side, memory
T41	2580541Z02	transformer, balun
T42	2580541Z02	transformer, balun
U51	5186144B01	receiver system (IFIC), SA616
U52	5109522E10	triple inverter, TC7W04F
U110	5102466J03	transmitter PA module, RA07M1317M_VHF
U150	5113818A01	dual opamp, LM2904
U151	2484657R01	bead
U201*	5185963A27	frequency synthesizer
U251	5105750U54	VCO/buffer
U310	5102478J01	5V voltage regulator, TK71750S
U320	5185963A55	adjustable voltage regulator w/ reset, LP2986
U330	5102479J01	3V voltage regulator, TK71730S
U401*	5102226J56	microprocessor, MC68HC11FL0
U402*	5102463J64	serial EEPROM 16Kx8, AT25128
U403	NOT PLACED	64AM DUMMY PART NUMBER
U404*	5102480J01	Flash ROM 128Kx8, AT49LV001N_70V
U451	5185130C53	audio filter (ASFIC_cmp)
U480	5113818A01	dual opamp, LM2904
U490	5108858K99	audio power amplifier, TDA8541
U510	5113818A01	dual opamp, LM2904
VR110	NOT PLACED	64AM DUMMY PART NUMBER
VR301	4813830A33	zener diode, 20V, MMBZ5250B
VR302	4813830A33	zener diode, 20V, MMBZ5250B
VR471	4813830A18	zener diode, 6.8V, MMBZ5235B
VR472	4813830A09	zener diode, 3.3V, MMBZ5226B
VR473	4813830A33	zener diode, 20V, MMBZ5250B
VR474	4813830A33	zener diode, 20V, MMBZ5250B
VR475	4880140L20	zener diode, 15V, MMBZ5245B
Y51	4880606B09	crystal, 44.395 MHz
Y70	9186145B02	ceramic discriminator, 455 kHz
Y201*	4880114R06	crystal, 16.8 MHz
Y202	NOT PLACED	64AM DUMMY PART NUMBER

* Motorola Depot Servicing only

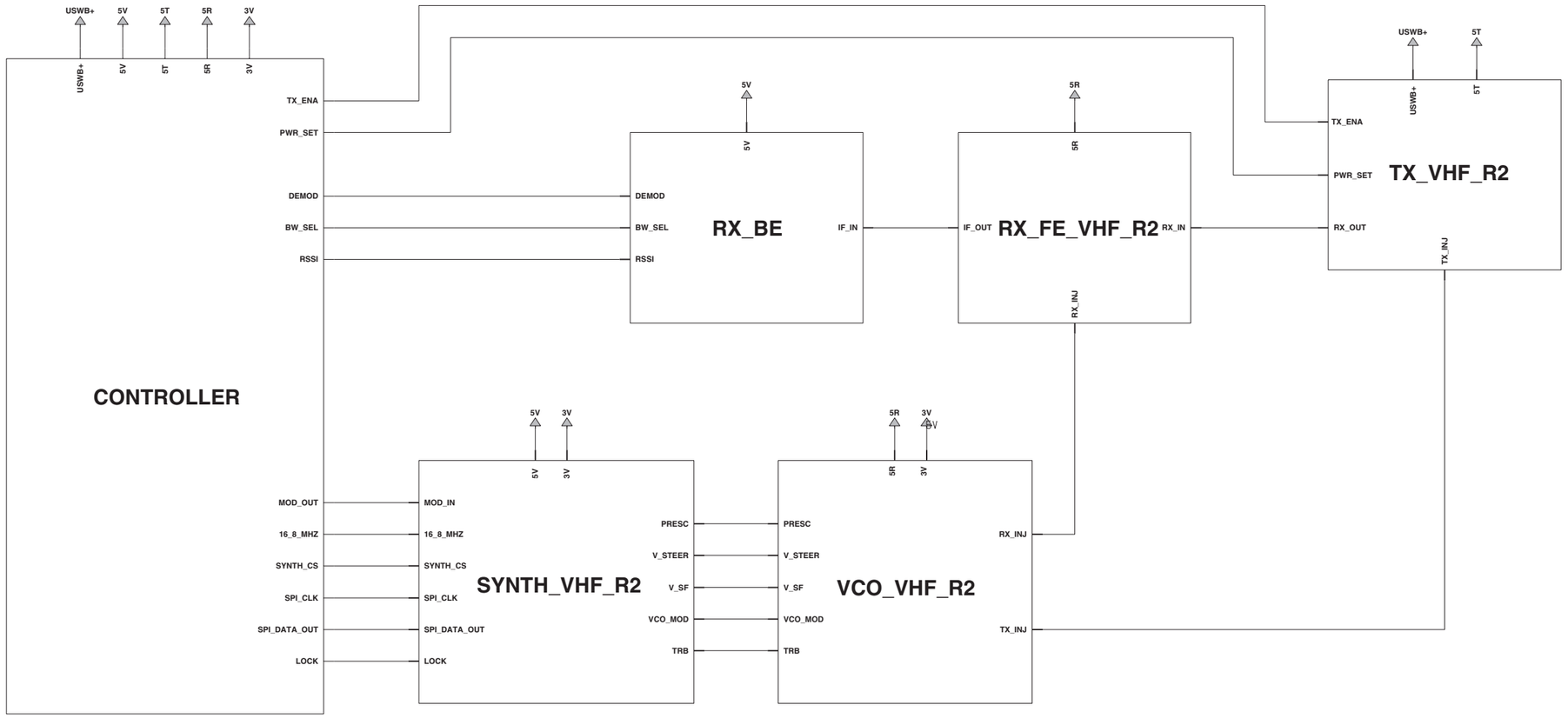


Figure 7-62. VHF (146–174 MHz) Radio Circuit Block Interconnect Diagram (8486342Z13-C)

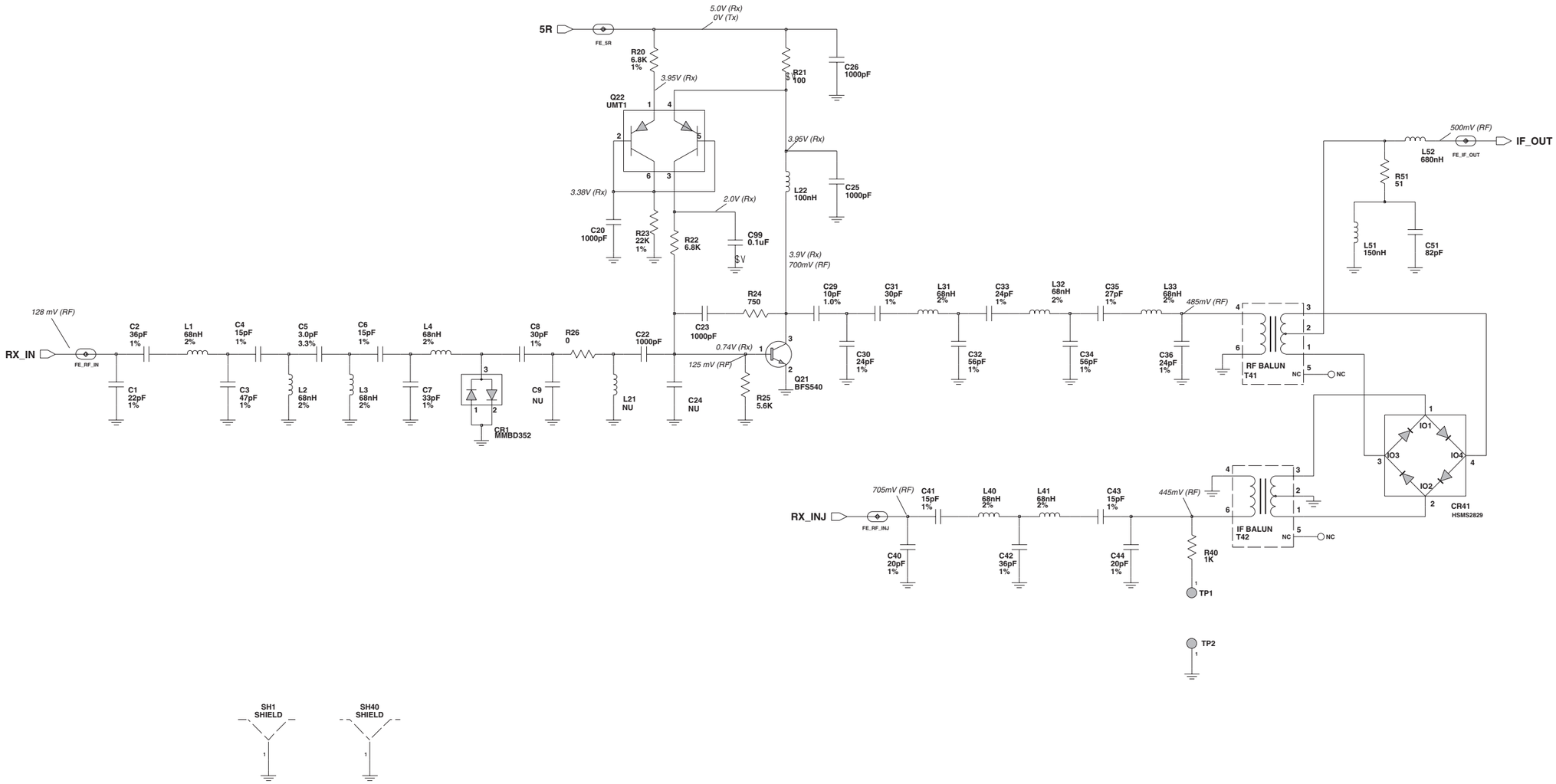


Figure 7-63. VHF (146–174 MHz) Receiver Front End Schematic Diagram (8486342Z13-C)

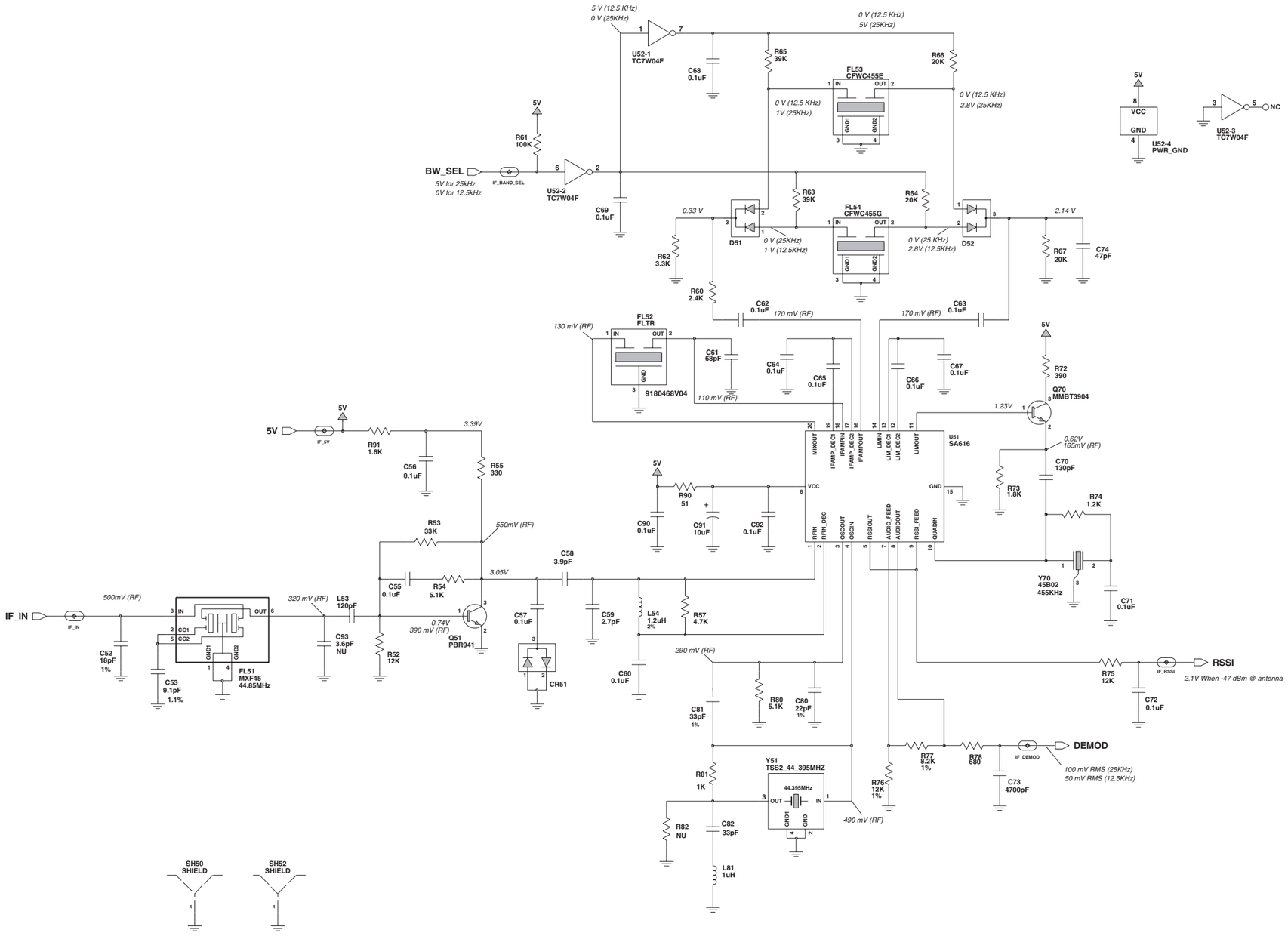
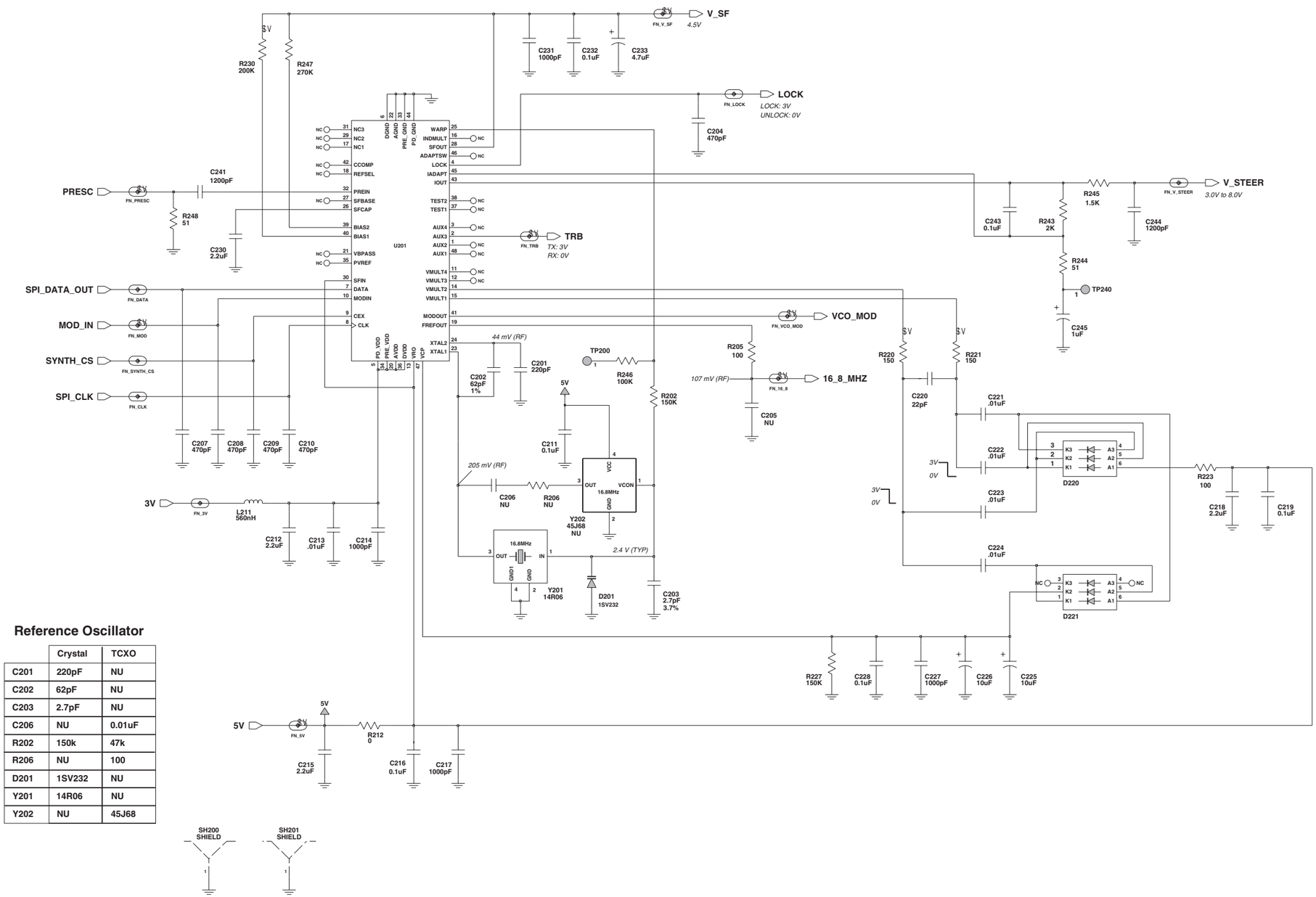


Figure 7-64. VHF (146–174 MHz) Receiver Back End Schematic Diagram (8486342Z13-C)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 7-65. VHF (146–174 MHz) Synthesizer Schematic Diagram (8486342Z13-C)

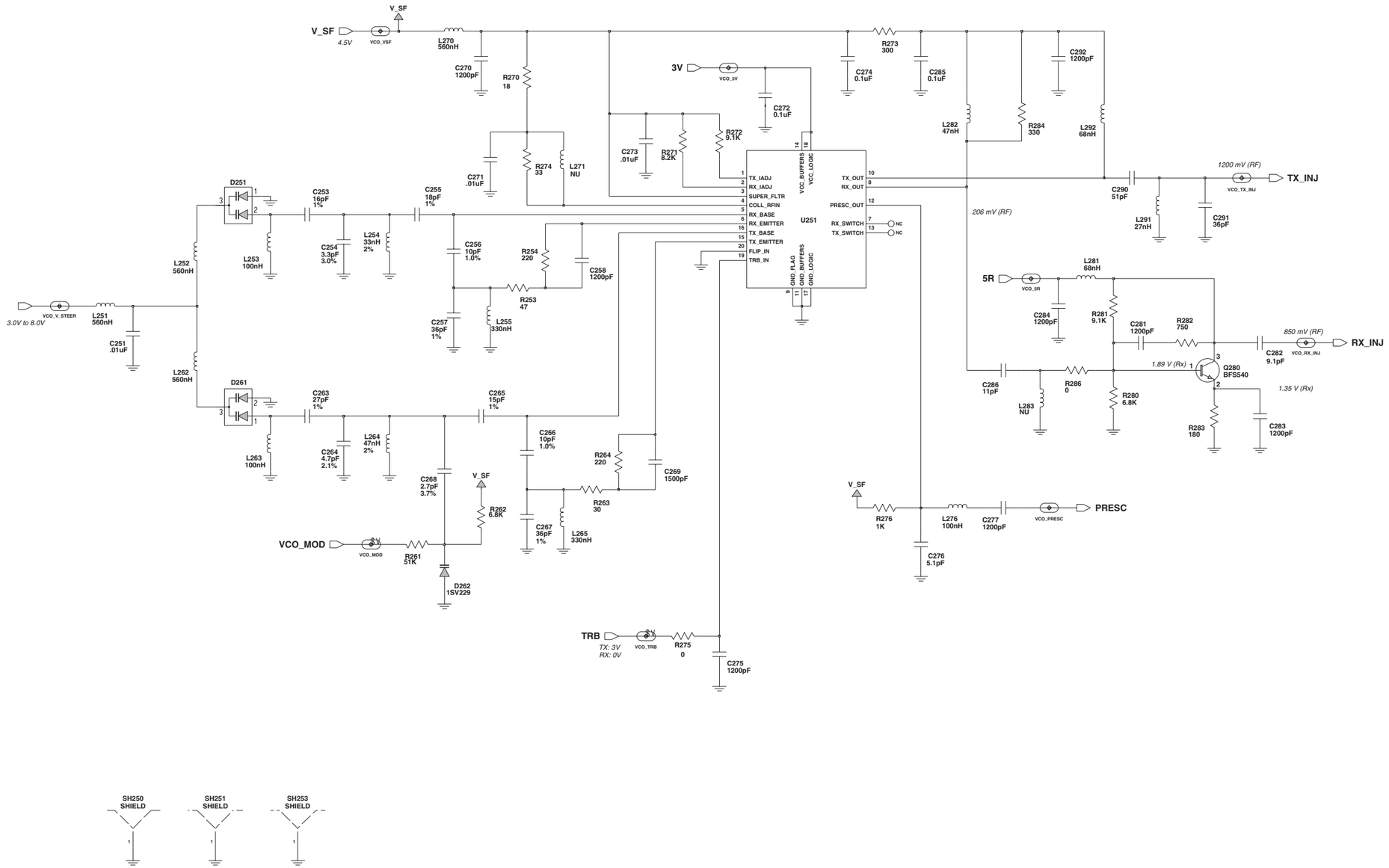


Figure 7-66. VHF (146–174 MHz) Voltage Controlled Oscillator Schematic Diagram (8486342Z13-C)

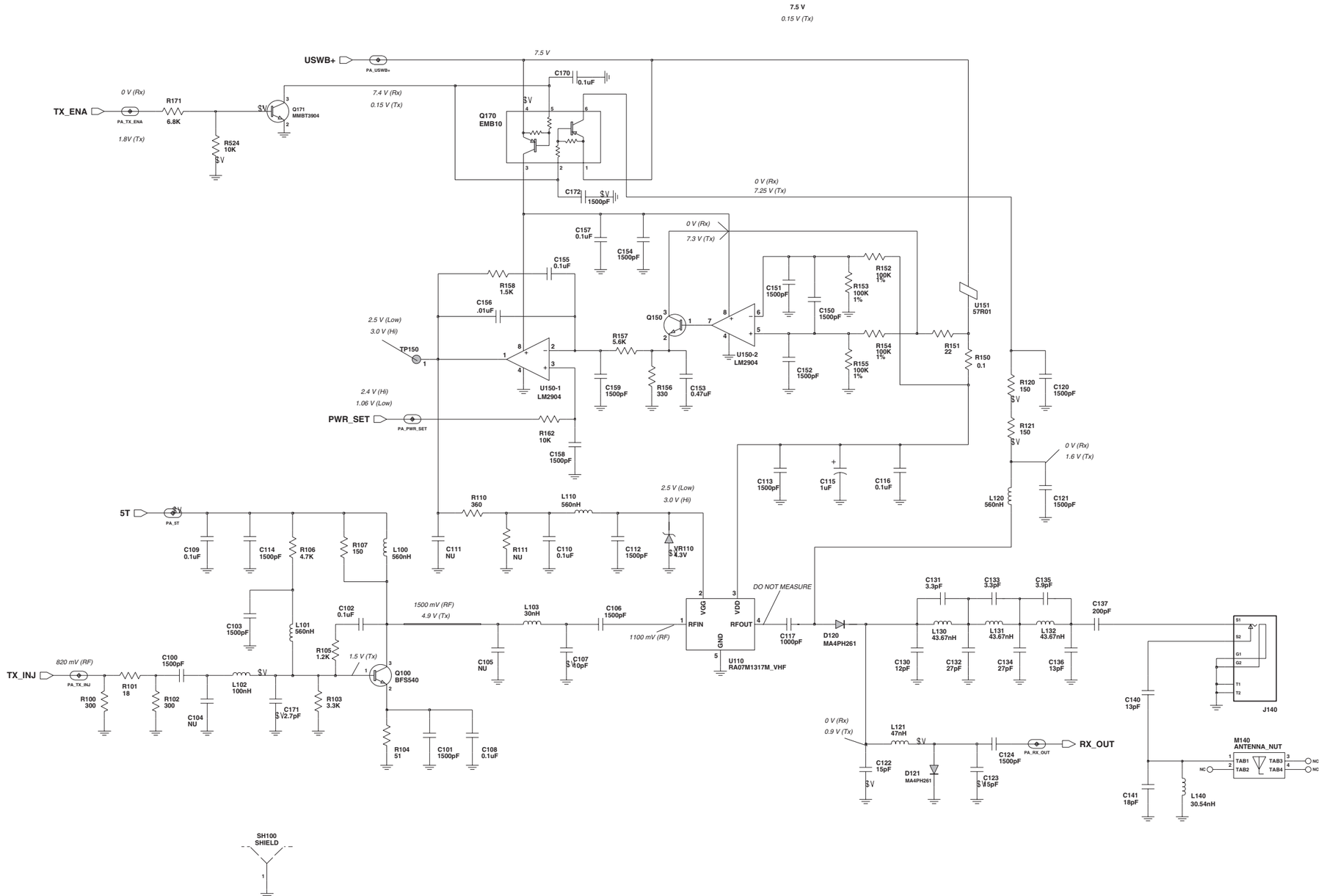


Figure 7-67. VHF (146–174 MHz) Transmitter and Power Control Schematic Diagram (8486342Z13-C)

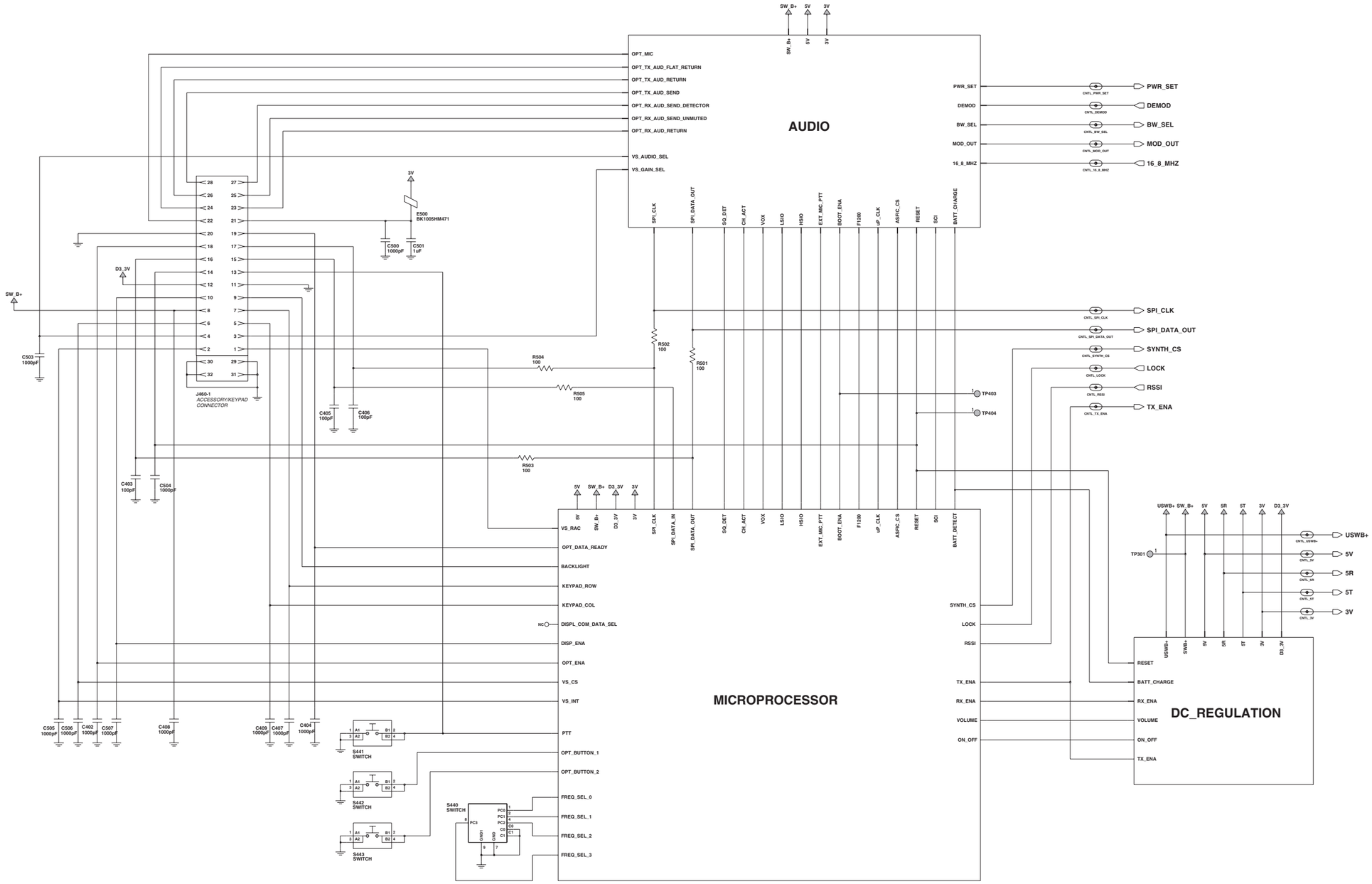


Figure 7-68. VHF (146–174 MHz) Controller Interconnect Schematic Diagram (8486342Z13-C)

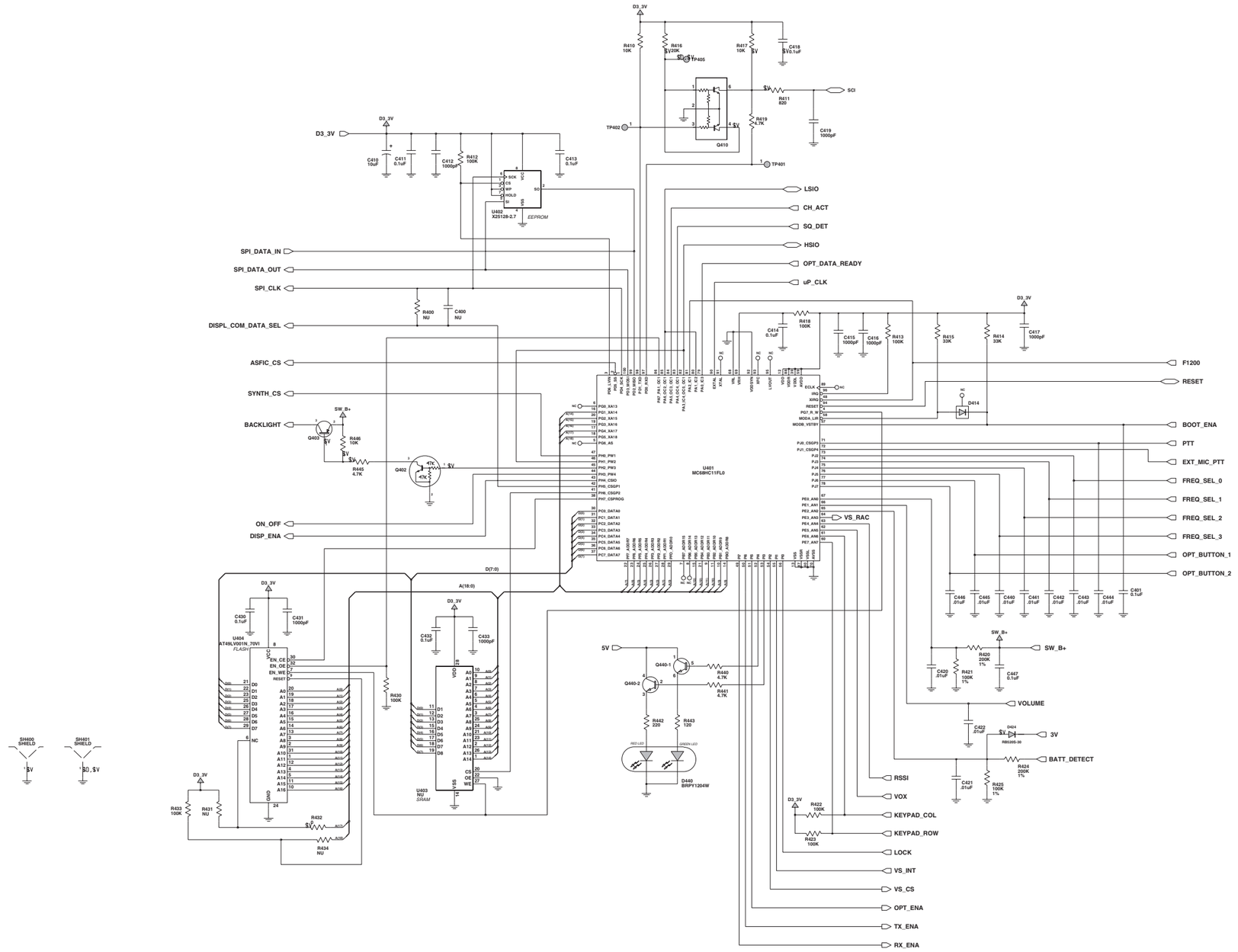


Figure 7-69. VHF (146–174 MHz) Microprocessor Circuitry Schematic Diagram (8486342Z13-C)

	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

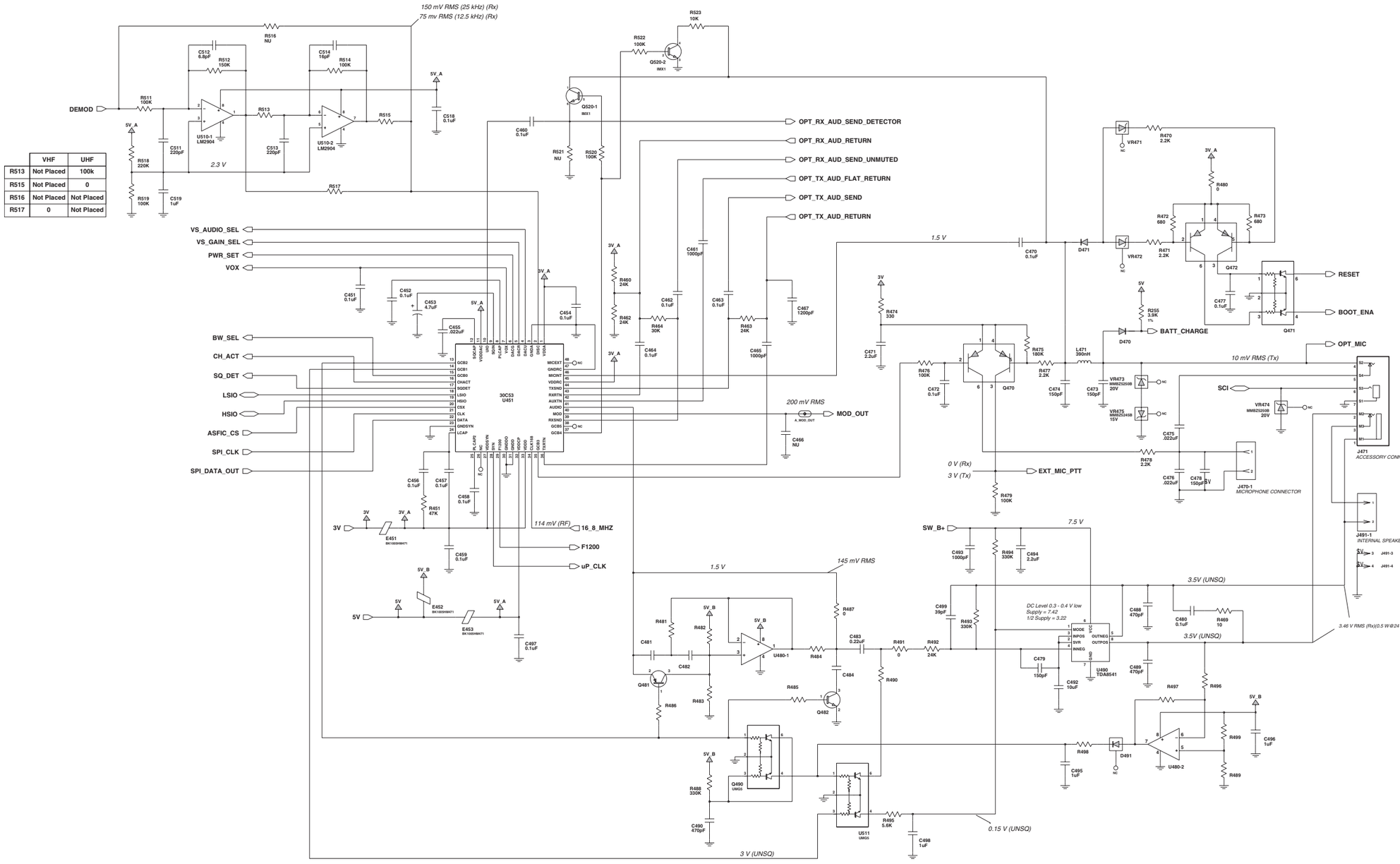


Figure 7-70. VHF (146–174 MHz) Audio Circuitry Schematic Diagram (8486342Z13-C)

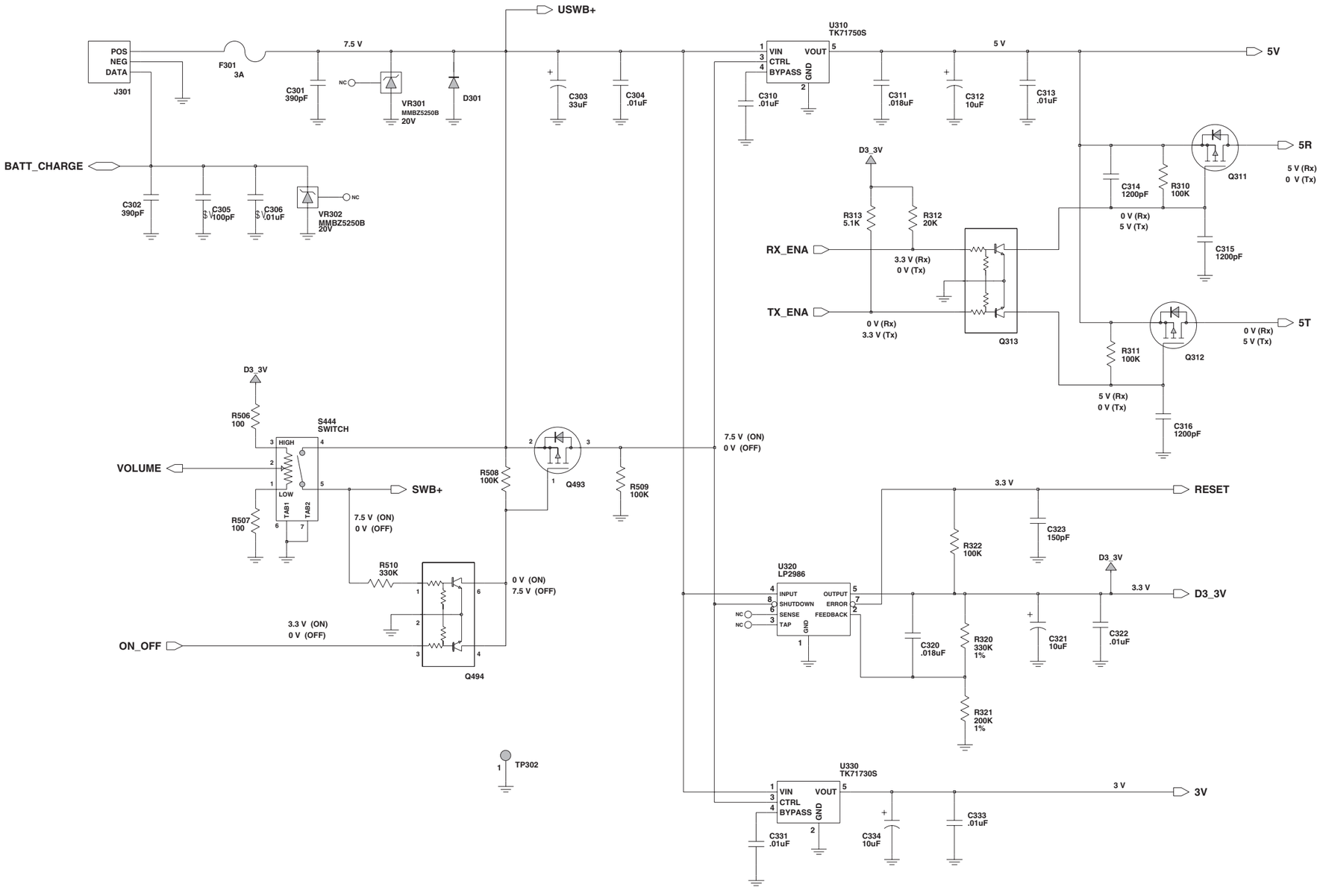
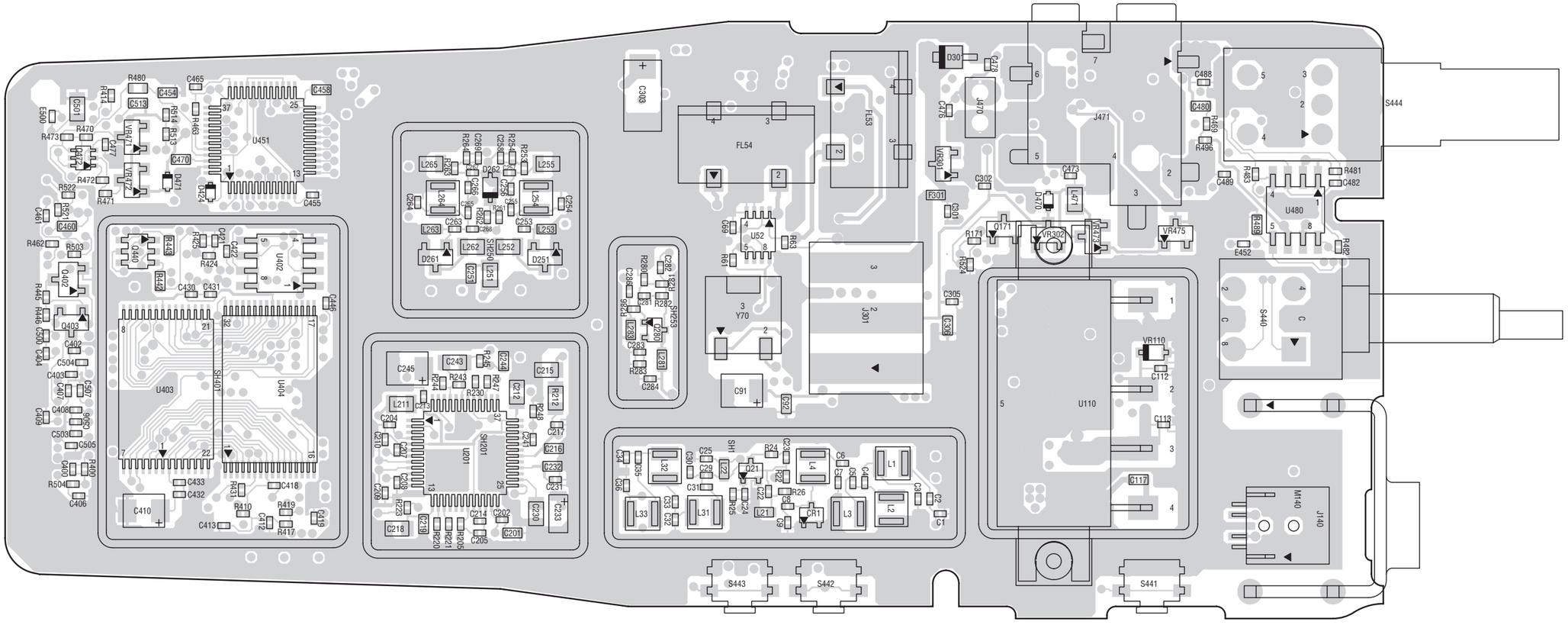


Figure 7-71. VHF (146–174 MHz) DC Regulation Schematic Diagram (8486342Z13-C)


R480
C465
C454
C458
C513
C501
R414
E500
R514
R463
R473
R470
C477
VR471
VR472
C470
D471
R472
D424
R471
R522
C455
C461
R521
C460
R462
R503
Q402
R448
Q403
R445
R446
C300
C404
C402
C504
C403
C407
C507
C408
C409
C503
C505
C400
R504
C406
R425
C421
C422
R424
U402
C430
C431
C446
U403
SH401
U404
C433
C432
R433
C418
C410
R410
R419
C413
R412
R417
C419
C265
C264
C263
C262
C261
C260
C259
C258
R264
R263
R262
R261
R254
R253
L265
L264
L263
L262
L261
L260
L259
L258
L257
L256
L255
L254
L253
L252
L251
C254
C253
D262
D261
D251
C256
C255
SH250
C308
FL54
FL53
D30
C428
C476
J470
J471
C488
C480
R469
R496
S444
VR301
C302
F301
C301
C473
D470
D471
C489
R493
R481
C482
U480
L438
R482
E452
R171
Q171
VR302
R473
VR475
R524
C305
C306
U52
R59
R63
R61
Y70
C91
C92
J301
R280
C282
C284
R281
R282
SH253
R283
C283
C285
C286
C287
C288
C289
C290
C291
C292
C293
C294
C295
C296
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C1
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C40

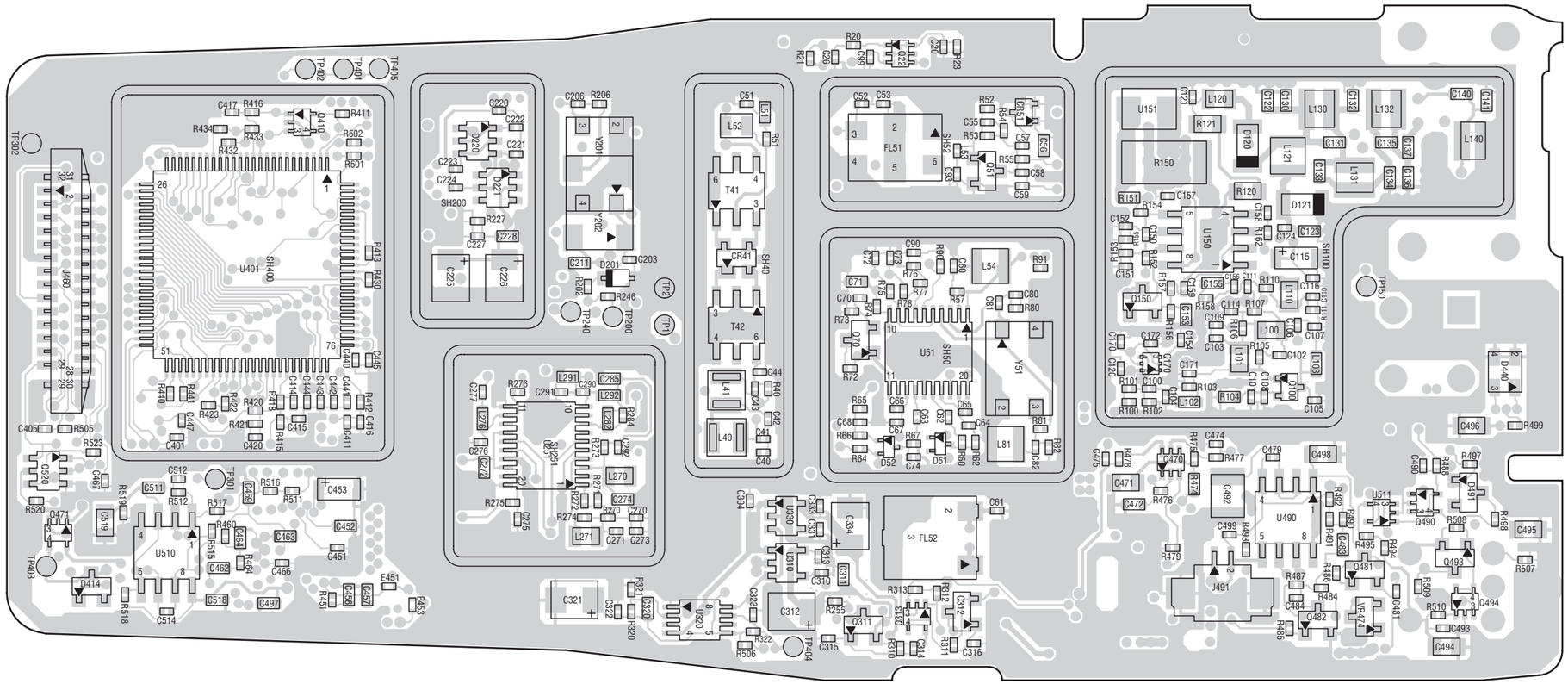


Figure 7-73. VHF (146–174 MHz) Board Solder Side View (8486342Z13-C)

VHF (146–174 MHz) Radio Parts List (8486342Z13-C)

Circuit Ref	Motorola Part No.	Description
C1	2109445U41	CAP, 22pF
C2	2109445U46	CAP, 36pF
C3	2109445U49	CAP, 47pF
C4	2109445U37	CAP, 15pF
C5	2109445U14	CAP, 3.0pF
C6	2109445U37	CAP, 15pF
C7	2109445U45	CAP, 33pF
C8	2109445U44	CAP, 30pF
C9	NOT PLACED	CAP, 4.7pF
C20	2113743L17	CAP, 1000pF
C22	2113743L17	CAP, 1000pF
C23	2113743L17	CAP, 1000pF
C24	NOT PLACED	CAP, 6.2pF
C25	2113743L17	CAP, 1000pF
C26	2113743L17	CAP, 1000pF
C29	2109445U27	CAP, 10pF
C30	2109445U42	CAP, 24pF
C31	2109445U44	CAP, 30pF
C32	2109445U51	CAP, 56pF
C33	2109445U42	CAP, 24pF
C34	2109445U51	CAP, 56pF
C35	2109445U43	CAP, 27pF
C36	2109445U42	CAP, 24pF
C40	2109445U40	CAP, 20pF
C41	2109445U37	CAP, 15pF
C42	2109445U46	CAP, 36pF
C43	2109445U37	CAP, 15pF
C44	2109445U40	CAP, 20pF
C51	2113743N48	CAP, 82pF
C52	2109445U39	CAP, 18pF
C53	2109445U26	CAP, 9.1pF
C55	2113743M24	CAP, 0.1uF
C56	2113743E20	CAP, 0.1uF
C57	2113743M24	CAP, 0.1uF
C58	2113743N16	CAP, 3.9pF
C59	2113743N12	CAP, 2.7pF
C60	2113743M24	CAP, 0.1uF
C61	2113743N46	CAP, 68pF
C62	2113743M24	CAP, 0.1uF
C63	2113743M24	CAP, 0.1uF
C64	2113743M24	CAP, 0.1uF
C65	2113743M24	CAP, 0.1uF
C66	2113743M24	CAP, 0.1uF
C67	2113743M24	CAP, 0.1uF
C68	2113743M24	CAP, 0.1uF
C69	2113743M24	CAP, 0.1uF
C70	2113743N53	CAP, 130pF
C71	2113743E20	CAP, 0.1uF
C72	2113743M24	CAP, 0.1uF
C73	2113743L33	CAP, 4700pF
C74	2113743N42	CAP, 47pF
C80	2109445U41	CAP, 22pF
C81	2109445U45	CAP, 33pF
C82	2109445U45	CAP, 33pF
C90	2113743M24	CAP, 0.1uF
C91	2311049A57	CAPP, 10uF
C92	2113743E20	CAP, 0.1uF
C93	NOT PLACED	CAP, 3.6pF
C99	2113743M24	CAP, 0.1uF
C100	2113743L21	CAP, 1500pF
C101	2113743L21	CAP, 1500pF
C102	2113743M24	CAP, 0.1uF
C103	2113743L21	CAP, 1500pF
C104	NOT PLACED	CAP, 27pF
C105	NOT PLACED	CAP, 10pF
C106	2113743L21	CAP, 1500pF
C107	2113743N26	CAP, 10pF
C108	2113743M24	CAP, 0.1uF
C109	2113743M24	CAP, 0.1uF
C110	2113743M24	CAP, 0.1uF
C111	NOT PLACED	CAP, 1500pF
C112	2113743L21	CAP, 1500pF
C113	2113743L21	CAP, 1500pF
C114	2113743L21	CAP, 1500pF
C115	2311049A07	CAPP, 1uF
C116	2113743M24	CAP, 0.1uF
C117	2113741F25	CAP, 1000pF
C120	2113743L21	CAP, 1500pF
C121	2113743L21	CAP, 1500pF
C122	2113740F31	CAP, 15pF
C123	2113740F31	CAP, 15pF
C124	2113743L21	CAP, 1500pF
C130	2113740F29	CAP, 12pF
C131	2113740F15	CAP, 3.3pF
C132	2113740F37	CAP, 27pF
C133	2113740F15	CAP, 3.3pF
C134	2113740F37	CAP, 27pF
C135	2113740F17	CAP, 3.9pF
C136	2113740F30	CAP, 13pF
C137	2113740F58	CAP, 200pF
C140	2113740F30	CAP, 13pF
C141	2113740F33	CAP, 18pF
C150	2113743L21	CAP, 1500pF
C151	2113743L21	CAP, 1500pF
C152	2113743L21	CAP, 1500pF
C153	2113743K18	CAP, 0.47uF
C154	2113743L21	CAP, 1500pF
C155	2113743E20	CAP, 0.1uF
C156	2113743L41	CAP, .01uF
C157	2113743M24	CAP, 0.1uF
C158	2113743L21	CAP, 1500pF
C159	2113743L21	CAP, 1500pF
C170	2113743M24	CAP, 0.1uF
C171	2113743N12	CAP, 2.7pF
C172	2113743L21	CAP, 1500pF
C201	2113740F59	CAP, 220pF
C202	2109445U52	CAP, 62pF
C203	2109445U13	CAP, 2.7pF
C204	2113743L09	CAP, 470pF
C205	NOT PLACED	CAP, 2.7pF
C206	NOT PLACED	CAP, 1000pF
C207	2113743L09	CAP, 470pF
C208	2113743L09	CAP, 470pF
C209	2113743L09	CAP, 470pF
C210	2113743L09	CAP, 470pF
C211	2113743E20	CAP, 0.1uF
C212	2113743F18	CAP, 2.2uF
C213	2113743L41	CAP, .01uF
C214	2113743L17	CAP, 1000pF
C215	2113743F18	CAP, 2.2uF
C216	2113743E20	CAP, 0.1uF
C217	2113743L17	CAP, 1000pF
C218	2113743F18	CAP, 2.2uF
C219	2113743E20	CAP, 0.1uF
C220	2113743N34	CAP, 22pF
C221	2113743L41	CAP, .01uF
C222	2113743L41	CAP, .01uF
C223	2113743L41	CAP, .01uF
C224	2113743L41	CAP, .01uF
C225	2311049A57	CAPP, 10uF
C226	2311049A57	CAPP, 10uF
C227	2113743L17	CAP, 1000pF
C228	2113743E20	CAP, 0.1uF
C230	2113743F18	CAP, 2.2uF
C231	2113743L17	CAP, 1000pF
C232	2113743E20	CAP, 0.1uF
C233	2311049A56	CAPP, 4.7uF
C241	2113743L19	CAP, 1200pF
C243	2113741M69	CAP, 0.1uF
C244	2113741F27	CAP, 1200pF
C245	2311049A08	CAPP, 1uF
C251	2113741F49	CAP, .01uF
C253	2109445U38	CAP, 16pF
C254	2109445U15	CAP, 3.3pF
C255	2109445U39	CAP, 18pF
C256	2109445U27	CAP, 10pF
C257	2109445U46	CAP, 36pF
C258	2113743L19	CAP, 1200pF
C263	2109445U43	CAP, 27pF
C264	2109445U19	CAP, 4.7pF
C265	2109445U37	CAP, 15pF
C266	2109445U27	CAP, 10pF
C267	2109445U46	CAP, 36pF
C268	2109445U13	CAP, 2.7pF
C269	2113743L21	CAP, 1500pF
C270	2113743L19	CAP, 1200pF
C271	2113743L41	CAP, .01uF
C272	2113743E20	CAP, 0.1uF
C273	2113743L41	CAP, .01uF
C274	2113743E20	CAP, 0.1uF
C275	2113743L19	CAP, 1200pF
C276	2113743N19	CAP, 5.1pF
C277	2113743L19	CAP, 1200pF
C281	2113743L19	CAP, 1200pF
C282	2113743N25	CAP, 9.1pF
C283	2113743L19	CAP, 1200pF
C284	2113743L19	CAP, 1200pF
C285	2113743E20	CAP, 0.1uF
C286	2113743N27	CAP, 11pF
C290	2113743N43	CAP, 51pF
C291	2113743N39	CAP, 36pF
C292	2113743L19	CAP, 1200pF
C301	2113743L07	CAP, 390pF
C302	2113743L07	CAP, 390pF
C303	2311049A97	CAPP, 33uF
C304	2113743L41	CAP, .01uF
C305	2113743N50	CAP, 100pF
C306	2113741F49	CAP, .01uF
C310	2113743L41	CAP, .01uF
C311	2113743E05	CAP, .018uF
C312	2311049A57	CAPP, 10uF
C313	2113743L41	CAP, .01uF
C314	2113743L19	CAP, 1200pF
C315	2113743L19	CAP, 1200pF
C316	2113743L19	CAP, 1200pF
C320	2113743E05	CAP, .018uF
C321	2311049A57	CAPP, 10uF
C322	2113743L41	CAP, .01uF
C323	2113743N54	CAP, 150pF
C331	2113743L41	CAP, .01uF
C333	2113743L41	CAP, .01uF
C334	2311049A57	CAPP, 10uF
C400	NOT PLACED	CAP, .022uF
C401	2113743M24	CAP, 0.1uF
C402	2113743L17	CAP, 1000pF
C403	2113743N50	CAP, 100pF
C404	2113743L17	CAP, 1000pF
C405	2113743N50	CAP, 100pF
C406	2113743N50	CAP, 100pF
C407	2113743L17	CAP, 1000pF
C408	2113743L17	CAP, 1000pF
C409	2113743L17	CAP, 1000pF
C410	2311049A57	CAPP, 10uF

Circuit Ref	Motorola Part No.	Description
C411	2113743M24	CAP, 0.1uF
C412	2113743L17	CAP, 1000pF
C413	2113743M24	CAP, 0.1uF
C414	2113743M24	CAP, 0.1uF
C415	2113743L17	CAP, 1000pF
C416	2113743L17	CAP, 1000pF
C417	2113743L17	CAP, 1000pF
C418	2113743M24	CAP, 0.1uF
C419	2113743L17	CAP, 1000pF
C420	2113743L41	CAP, .01uF
C421	2113743L41	CAP, .01uF
C422	2113743L41	CAP, .01uF
C430	2113743M24	CAP, 0.1uF
C431	2113743L17	CAP, 1000pF
C432	2113743M24	CAP, 0.1uF
C433	2113743L17	CAP, 1000pF
C440	2113743L41	CAP, .01uF
C441	2113743L41	CAP, .01uF
C442	2113743L41	CAP, .01uF
C443	2113743L41	CAP, .01uF
C444	2113743L41	CAP, .01uF
C445	2113743L41	CAP, .01uF
C446	2113743L41	CAP, .01uF
C447	2113743M24	CAP, 0.1uF
C451	2113743M24	CAP, 0.1uF
C452	2113743E20	CAP, 0.1uF
C453	2311049A56	CAPP, 4.7uF
C454	2113743E20	CAP, 0.1uF
C455	2113743L48	CAP, .022uF
C456	2113743E20	CAP, 0.1uF
C457	2113743E20	CAP, 0.1uF
C458	2113743E20	CAP, 0.1uF
C459	2113743E20	CAP, 0.1uF
C460	2113743E20	CAP, 0.1uF
C461	2113743L17	CAP, 1000pF
C462	2113743E20	CAP, 0.1uF
C463	2113743E20	CAP, 0.1uF
C464	2113743E20	CAP, 0.1uF
C465	2113743L17	CAP, 1000pF
C466	NOT PLACED	CAP, 470pF
C467	2113743L19	CAP, 1200pF
C470	2113743E20	CAP, 0.1uF
C471	2113743F18	CAP, 2.2uF
C472	2113743E20	CAP, 0.1uF
C473	2113743N54	CAP, 150pF
C474	2113743N54	CAP, 150pF
C475	2113743L48	CAP, .022uF
C476	2113743L48	CAP, .022uF
C477	2113743M24	CAP, 0.1uF
C478	2113743N54	CAP, 150pF
C479	2113743N54	CAP, 150pF
C480	2113743E20	CAP, 0.1uF
C481	NOT PLACED	CAP, .01uF
C482	NOT PLACED	CAP, .01uF
C483	2113928H02	CAP, 0.22uF
C484	NOT PLACED	CAP, .033uF
C488	2113743L09	CAP, 470pF
C489	2113743L09	CAP, 470pF
C490	2113743L09	CAP, 470pF
C492	2113928J08	CAP, 10uF
C493	2113743L17	CAP, 1000pF
C494	2113743F18	CAP, 2.2uF
C495	2113743F16	CAP, 1uF
C496	2113743F16	CAP, 1uF
C497	2113743E20	CAP, 0.1uF
C498	2113743F16	CAP, 1uF
C499	2113743N40	CAP, 39pF
C500	2113743L17	CAP, 1000pF
C501	2113743F16	CAP, 1uF
C503	2113743L17	CAP, 1000pF
C504	2113743L17	CAP, 1000pF
C505	2113743L17	CAP, 1000pF
C506	2113743L17	CAP, 1000pF
C507	2113743L17	CAP, 1000pF
C511	2113740F59	CAP, 220pF
C512	2113743N22	CAP, 6.8pF
C513	2113740F59	CAP, 220pF
C514	2113743N31	CAP, 16pF
C518	2113743E20	CAP, 0.1uF
C519	2113743F16	CAP, 1uF
CR1	4813825A19	MMBD352
CR41	4802246J04	HSMS2829
CR51	4813825A19	MMBD352
D51	4802245J97	DAN235ETL
D52	4802245J97	DAN235ETL
D120	4880973Z02	MA4PH261
D121	4880973Z02	MA4PH261
D201	4862824C03	1SV232
D220	4802233J09	IMN10
D221	4802233J09	IMN10
D251	4805649Q13	1SV228
D261	4805649Q13	1SV228
D262	4862824C01	1SV229
D301	4813833A19	MBRM120ET3
D414	4805129M41	MMBD501
D424	4809924D18	RB520S-30
D440	4805729G49	BRPY1204W
D470	4809924D18	RB520S-30
D471	4809924D18	RB520S-30
D491	NOT PLACED	MMBD501
E451	2480640Z01	BK1005HM471
E452	2480640Z01	BK1005HM471
E453	2480640Z01	BK1005HM471
E500	2480640Z01	BK1005HM471
F301	6580542Z01	FUSE
FL51	9180022M11	MXF45
FL52	9180468V04	FLTR
FL53	9180469V05	CFWC455E
FL54	9180469V03	CFWC455G
J140	0986428Z01	connector, external antenna
J301	0986565Z01	battery contact assembly
J460	NOT PLACED	CONN_J
J470	0985818A01	connector, 2-pin, internal mic
J471	0980683Z03	connector, 2.5 / 3.5 mm, accessories
J491	2809926G01	connector, 2-pin, internal speaker
L1	2413923C09	IDCTR, 68nH
L2	2413923C09	IDCTR, 68nH
L3	2413923C09	IDCTR, 68nH
L4	2413923C09	IDCTR, 68nH
L21	NOT PLACED	IDCTR, 39nH
L22	2413926N24	IDCTR, 100nH
L31	2413923C09	IDCTR, 68nH
L32	2413923C09	IDCTR, 68nH
L33	2413923C09	IDCTR, 68nH
L40	2413923C09	IDCTR, 68nH
L41	2413923C09	IDCTR, 68nH
L51	2413926N26	IDCTR, 150nH
L52	2462587V44	IDCTR, 680nH
L53	2113743N52	CAP, 120pF
L54	2413923A25	IDCTR, 1.2uH
L81	2413923A19	IDCTR, 1uH
L100	2413926K32	IDCTR, 560nH
L101	2413926K32	IDCTR, 560nH
L102	2409377M17	IDCTR, 100nH
L103	2409377M31	IDCTR, 30nH
L110	2413926K32	IDCTR, 560nH
L120	2413926K32	IDCTR, 560nH
L121	2462587N49	IDCTR, 47nH
L130	2479990N01	IDCTR, 43.67nH
L131	2479990N01	IDCTR, 43.67nH
L132	2479990N01	IDCTR, 43.67nH
L140	2479990M01	IDCTR, 30.54nH
L211	2413926K32	IDCTR, 560nH
L251	2413926K32	IDCTR, 560nH
L252	2413926K32	IDCTR, 560nH
L253	2409377M17	IDCTR, 100nH
L254	2413923C05	IDCTR, 33nH
L255	2413926K29	IDCTR, 330nH
L262	2413926K32	IDCTR, 560nH
L263	2409377M17	IDCTR, 100nH
L264	2413923C07	IDCTR, 47nH
L265	2413926K29	IDCTR, 330nH
L270	2413926K32	IDCTR, 560nH
L271	NOT PLACED	IDCTR, 560nH
L276	2413926N24	IDCTR, 100nH
L281	2413926N22	IDCTR, 68nH
L282	2413926N20	IDCTR, 47nH
L283	NOT PLACED	IDCTR, 270nH
L291	2413926N17	IDCTR, 27nH
L292	2413926N22	IDCTR, 68nH
L471	2413926K30	IDCTR, 390nH
M140	0286427Z01	ANTENNA_NUT
Q21	4802245J95	BFS540
Q22	4805723X02	UMT1
Q51	4802197J95	PBR941
Q70	4880214G02	MMBT3904
Q100	4802245J95	BFS540
Q150	4880214G02	MMBT3904
Q170	4809939C34	EMB10
Q171	4880214G02	MMBT3904
Q280	4802245J95	BFS540
Q311	4809579E18	TP0101T
Q312	4809579E18	TP0101T
Q313	4802245J54	UMG5
Q402	4880048M01	DTC144EKA
Q403	4813824A17	MMBT3906
Q410	4802245J54	UMG5
Q440	5180159R01	IMX1
Q470	4805723X02	UMT1
Q471	4802245J54	UMG5
Q472	4805723X02	UMT1
Q481	NOT PLACED	MMBT3906
Q482	NOT PLACED	MMBT3904
Q490	4802245J54	UMG5
Q493	4809579E18	TP0101T
Q494	4802245J54	UMG5
Q520	5180159R01	IMX1
R20	0662057U97	RES, 6.8K
R21	0662057M50	RES, 100
R22	0662057M94	RES, 6.8K
R23	0662057V11	RES, 22K
R24	0662057M71	RES, 750
R25	0662057M92	RES, 5.6K
R26	0662057M01	RES, 0
R40	0662057M74	RES, 1K
R51	0662057M43	RES, 51
R52	0662057N01	RES, 12K
R53	0662057N11	RES, 33K
R54	0662057M91	RES, 5.1K
R55	0662057M62	RES, 330
R57	0662057M90	RES, 4.7K
R60	0662057M83	RES, 2.4K

Circuit Ref	Motorola Part No.	Description
R61	0662057N23	RES, 100K
R62	0662057M86	RES, 3.3K
R63	0662057N13	RES, 39K
R64	0662057N06	RES, 20K
R65	0662057N13	RES, 39K
R66	0662057N06	RES, 20K
R67	0662057N06	RES, 20K
R72	0662057M64	RES, 390
R73	0662057M80	RES, 1.8K
R74	0662057M76	RES, 1.2K
R75	0662057N01	RES, 12K
R76	0662057V04	RES, 12K
R77	0662057U99	RES, 8.2K
R78	0662057M70	RES, 680
R80	0662057M91	RES, 5.1K
R81	0662057M74	RES, 1K
R82	NOT PLACED	RES, 0
R90	0662057M43	RES, 51
R91	0662057M79	RES, 1.6K
R100	0662057M61	RES, 300
R101	0662057M32	RES, 18
R102	0662057M61	RES, 300
R103	0662057M86	RES, 3.3K
R104	0662057A18	RES, 51
R105	0662057M76	RES, 1.2K
R106	0662057M90	RES, 4.7K
R107	0662057M54	RES, 150
R110	0662057M63	RES, 360
R111	NOT PLACED	RES, 2.7K
R120	0662057C55	RES, 150
R121	0662057C55	RES, 150
R150	0680539Z01	RES, 0.1
R151	0662057A09	RES, 22
R152	0662057V27	RES, 100K
R153	0662057V27	RES, 100K
R154	0662057V27	RES, 100K
R155	0662057V27	RES, 100K
R156	0662057M62	RES, 330
R157	0662057M92	RES, 5.6K
R158	0662057M78	RES, 1.5K
R162	0662057M98	RES, 10K
R171	0662057M94	RES, 6.8K
R202	0662057N27	RES, 150K
R205	0662057M50	RES, 100
R206	NOT PLACED	RES, 100
R212	0662057C01	RES, 0
R220	0662057M54	RES, 150
R221	0662057M54	RES, 150
R223	0662057M50	RES, 100
R227	0662057N27	RES, 150K
R230	0662057N30	RES, 200K
R243	0662057M81	RES, 2K
R244	0662057M43	RES, 51
R245	0662057M78	RES, 1.5K
R246	0662057N23	RES, 100K
R247	0662057N33	RES, 270K
R248	0662057M43	RES, 51
R253	0662057M42	RES, 47
R254	0662057M58	RES, 220
R255	0662057U91	RES, 3.9K
R261	0662057N16	RES, 51K
R262	0662057M94	RES, 6.8K
R263	0662057M37	RES, 30
R264	0662057M58	RES, 220
R270	0662057M32	RES, 18
R271	0662057M96	RES, 8.2K
R272	0662057M97	RES, 9.1K
R273	0662057M61	RES, 300
R274	0662057M38	RES, 33
R275	0662057M01	RES, 0
R276	0662057M74	RES, 1K
R280	0662057M94	RES, 6.8K
R281	0662057M97	RES, 9.1K
R282	0662057M71	RES, 750
R283	0662057M56	RES, 180
R284	0662057M62	RES, 330
R286	0662057M01	RES, 0
R310	0662057N23	RES, 100K
R311	0662057N23	RES, 100K
R312	0662057N06	RES, 20K
R313	0662057M91	RES, 5.1K
R320	0662057V43	RES, 330K
R321	0662057V35	RES, 200K
R322	0662057N23	RES, 100K
R400	NOT PLACED	RES, 100K
R410	0662057M98	RES, 10K
R411	0662057M72	RES, 820
R412	0662057N23	RES, 100K
R413	0662057N23	RES, 100K
R414	0662057N11	RES, 33K
R415	0662057N11	RES, 33K
R416	0662057N06	RES, 20K
R417	0662057M98	RES, 10K
R418	0662057N23	RES, 100K
R419	0662057M90	RES, 4.7K
R420	0662057V35	RES, 200K
R421	0662057V27	RES, 100K
R422	0662057N23	RES, 100K
R423	0662057N23	RES, 100K
R424	0662057V35	RES, 200K
R425	0662057V27	RES, 100K
R430	0662057N23	RES, 100K
R431	NOT PLACED	RES, 100K
R432	0662057M01	RES, 0
R433	0662057N23	RES, 100K
R434	NOT PLACED	RES, 100K
R440	0662057M90	RES, 4.7K
R441	0662057M90	RES, 4.7K
R442	0662057A33	RES, 220
R443	0662057A27	RES, 120
R445	0662057M90	RES, 4.7K
R446	0662057M98	RES, 10K
R451	0662057N15	RES, 47K
R460	0662057N08	RES, 24K
R462	0662057N08	RES, 24K
R463	0662057N08	RES, 24K
R464	0662057N10	RES, 30K
R469	0662057M26	RES, 10
R470	0662057M82	RES, 2.2K
R471	0662057M82	RES, 2.2K
R472	0662057M70	RES, 680
R473	0662057M70	RES, 680
R474	0662057A37	RES, 330
R475	0662057N29	RES, 180K
R476	0662057N23	RES, 100K
R477	0662057M82	RES, 2.2K
R478	0662057M82	RES, 2.2K
R479	0662057N23	RES, 100K
R480	0662057B47	RES, 0
R481	NOT PLACED	RES, 100K
R482	NOT PLACED	RES, 330K
R483	NOT PLACED	RES, 150K
R484	NOT PLACED	RES, 2.2K
R485	NOT PLACED	RES, 100K
R486	NOT PLACED	RES, 100K
R487	0662057M01	RES, 0
R488	0662057N35	RES, 330K
R489	NOT PLACED	RES, 91K
R490	NOT PLACED	RES, 2.2K
R491	0662057M01	RES, 0
R492	0662057N08	RES, 24K
R493	0662057N35	RES, 330K
R494	0662057V43	RES, 330K
R495	0662057M92	RES, 5.6K
R496	NOT PLACED	RES, 10K
R497	NOT PLACED	RES, 1MEG
R498	NOT PLACED	RES, 47K
R499	NOT PLACED	RES, 270K
R501	0662057M50	RES, 100
R502	0662057M50	RES, 100
R503	0662057M50	RES, 100
R504	0662057M50	RES, 100
R505	0662057M50	RES, 100
R506	0662057M50	RES, 100
R507	0662057M50	RES, 100
R508	0662057N23	RES, 100K
R509	0662057N23	RES, 100K
R510	0662057N35	RES, 330K
R511	0662057N23	RES, 100K
R512	0662057N27	RES, 150K
R513	NOT PLACED	RES, 100K
R514	0662057N23	RES, 100K
R515	NOT PLACED	RES, 0
R516	NOT PLACED	RES, 0
R517	0662057M01	RES, 0
R518	0662057N31	RES, 220K
R519	0662057N23	RES, 100K
R520	0662057N23	RES, 100K
R521	NOT PLACED	RES, 100K
R522	0662057N23	RES, 100K
R523	0662057M98	RES, 10K
R524	0662057M98	RES, 10K
S440	4080710Z22 or 4080710Z13	switch, rotary, 16-Ch. select switch, rotary, 4-Ch. select
S441	4070354A01	switch, pushbutton PTT
S442	4070354A01	switch, pushbutton, side option (lower)
S443	4070354A01	switch, pushbutton, side option (upper)
S444	1880619Z02	switch, rotary on-off, with 10K volume control
SH1	2686421Z01	shield, comp side, RF front end
SH40	2686419Z01	shield, solder side, first mixer
SH50	2686423Z01	shield, solder side, IFIC and 2nd LO cyrstal
SH52	2686424Z01	shield, solder side, high IF crystal filter
SH100	2686418Z01	shield, solder side, transmitter
SH200	2686424Z01	shield, solder side, synthe-sizer charge pump
SH201	2686423Z01	shield, comp side, synthesizer
SH250	2686425Z01	shield, comp side, VCO tank circuits
SH251	2686425Z01	shield, solder side, VCOBIC
SH253	2686422Z01	shield, comp side, VCO RX injection buffer
SH400	2686420Z01	shield, solder side, micropro-cessor
SH401	2686420Z01	shield, comp side, memory
T41	2580541Z02	transformer, balun
T42	2580541Z02	transformer, balun
U51	5186144B01	SA616

Circuit Ref	Motorola Part No.	Description
U52	5109522E10	TC7W04F
U110	0186438Z01	RA07M1317M_VHF
U150	5113818A01	LM2904
U151	2484657R01	57R01
U201*	5185963A27	63A27
U251	5105750U54	50U54
U310	5102478J01	TK71750S
U320	5185963A55	LP2986
U330	5102479J01	TK71730S
U401*	5102226J56	MC68HC11FL0
U402*	5102463J64	X25128-2.7
U403	NOT PLACED	SRM2B256
U404*	5102480J01	AT49LV001N_70VI
U451	5185130C53	30C53
U480	NOT PLACED	LM2904
U490	5108858K99	TDA8541
U510	5113818A01	LM2904
U511	4802245J54	UMG5
VR110	4813830A82	MM3Z4V3T1
VR301	4813830A33	MMBZ5250B
VR302	4813830A33	MMBZ5250B
VR471	4813830A18	MMBZ5235B
VR472	4813830A09	MMBZ5226B
VR473	4813830A33	MMBZ5250B
VR474	4813830A33	MMBZ5250B
VR475	4880140L20	MMBZ5245B
Y51	4802245J84	45J84
Y70	9186145B02	45B02
Y201*	4880114R06	14R06
Y202	NOT PLACED	45J68

* Motorola Depot Servicing only

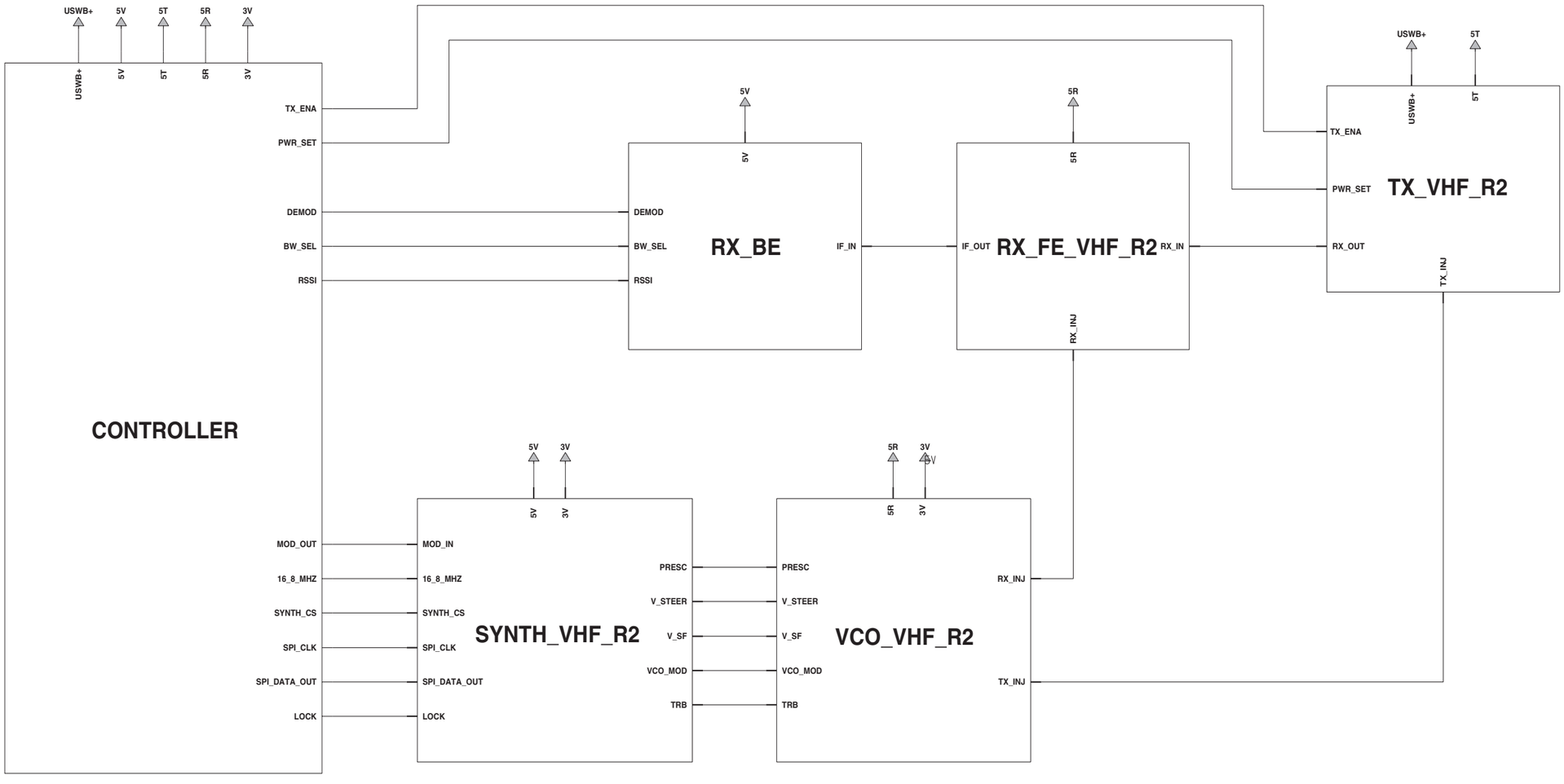


Figure 7-74. VHF (146–174 MHz) Radio Circuit Block Interconnect Diagram (8486769Z04-C/05-D)

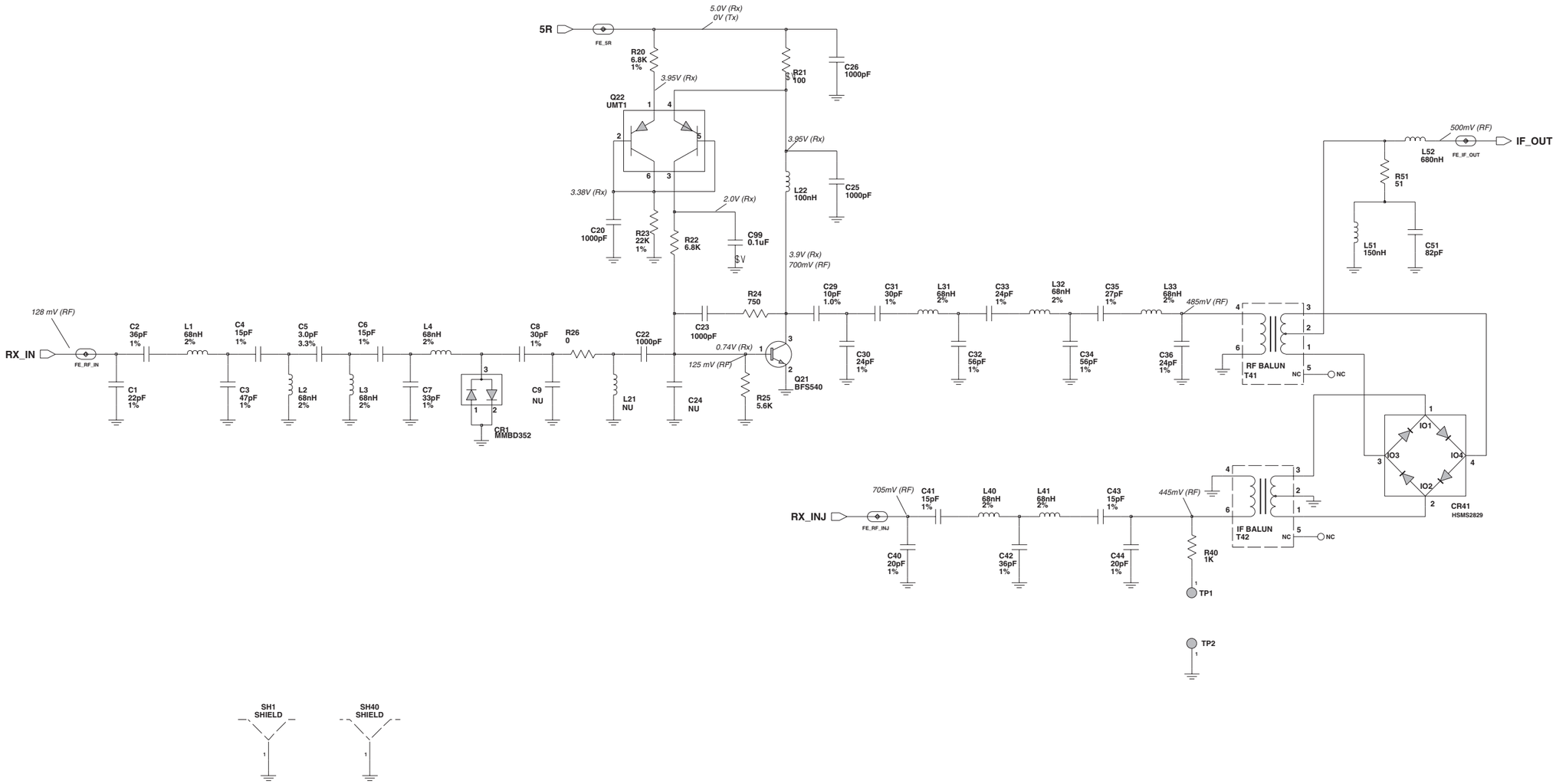


Figure 7-75. VHF (146–174 MHz) Receiver Front End Schematic Diagram (8486769Z04-C/05-D)

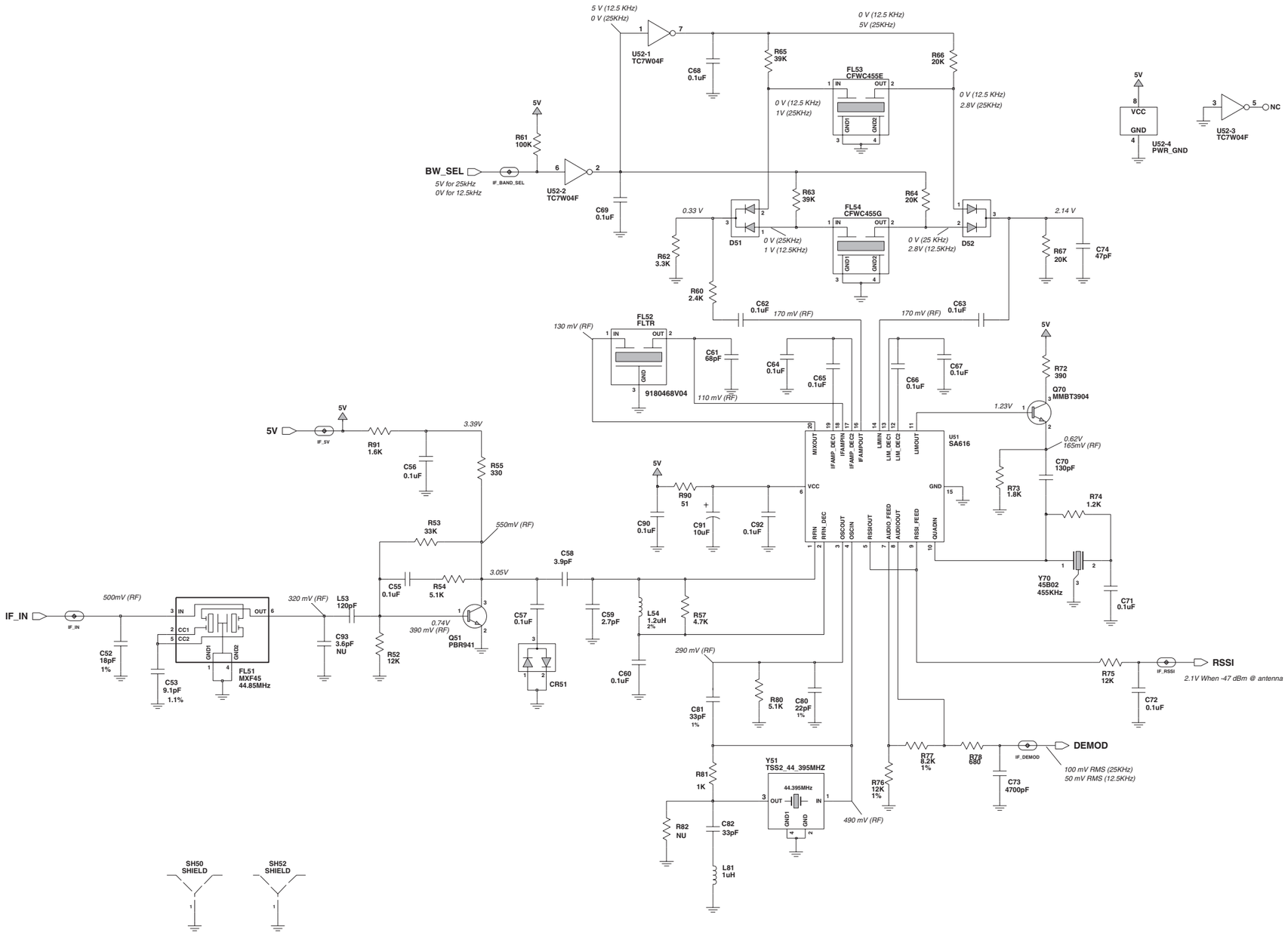
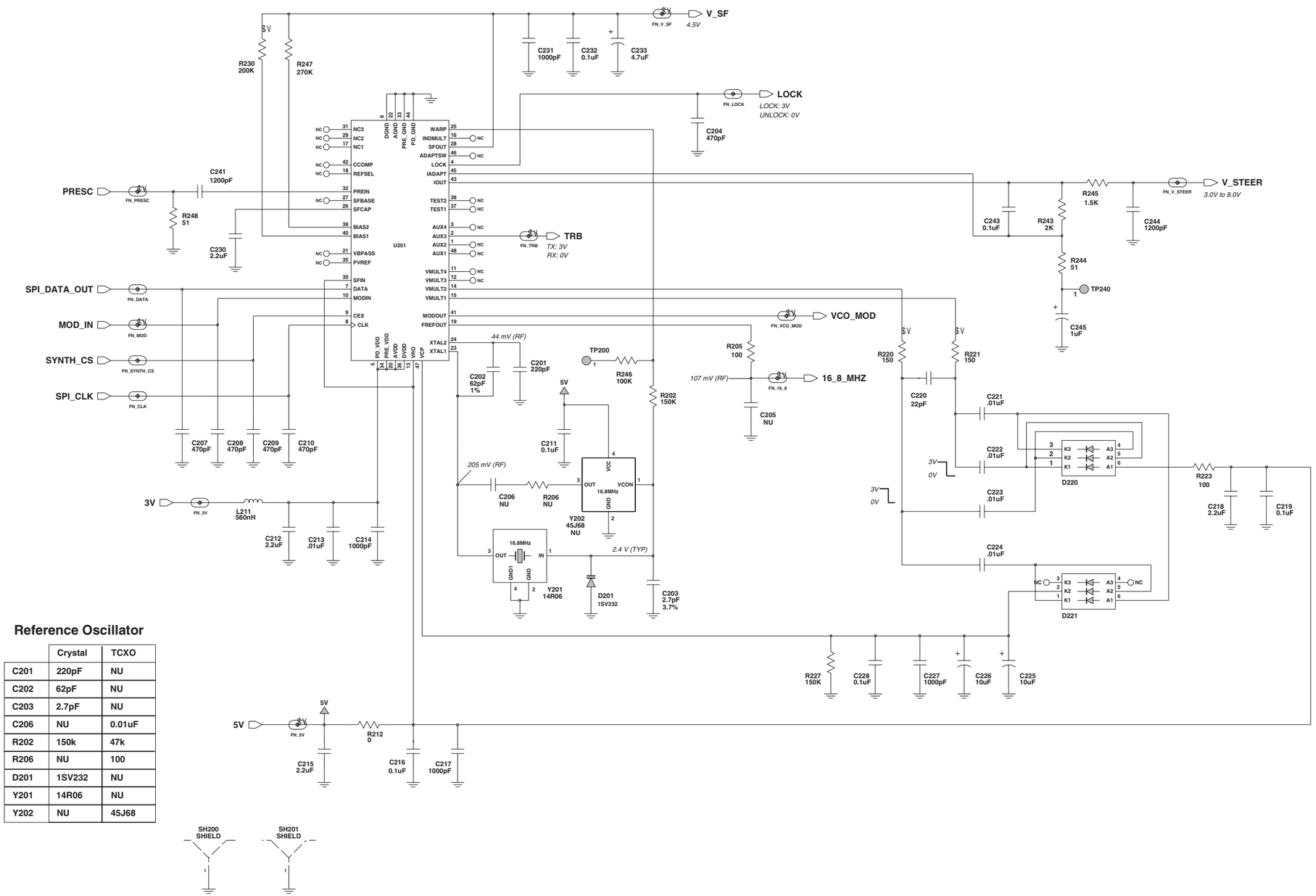


Figure 7-76. VHF (146–174 MHz) Receiver Back End Schematic Diagram (8486769Z04-C/05-D)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 7-77. VHF (146–174 MHz) Synthesizer Schematic Diagram (8486769Z04-C/05-D)

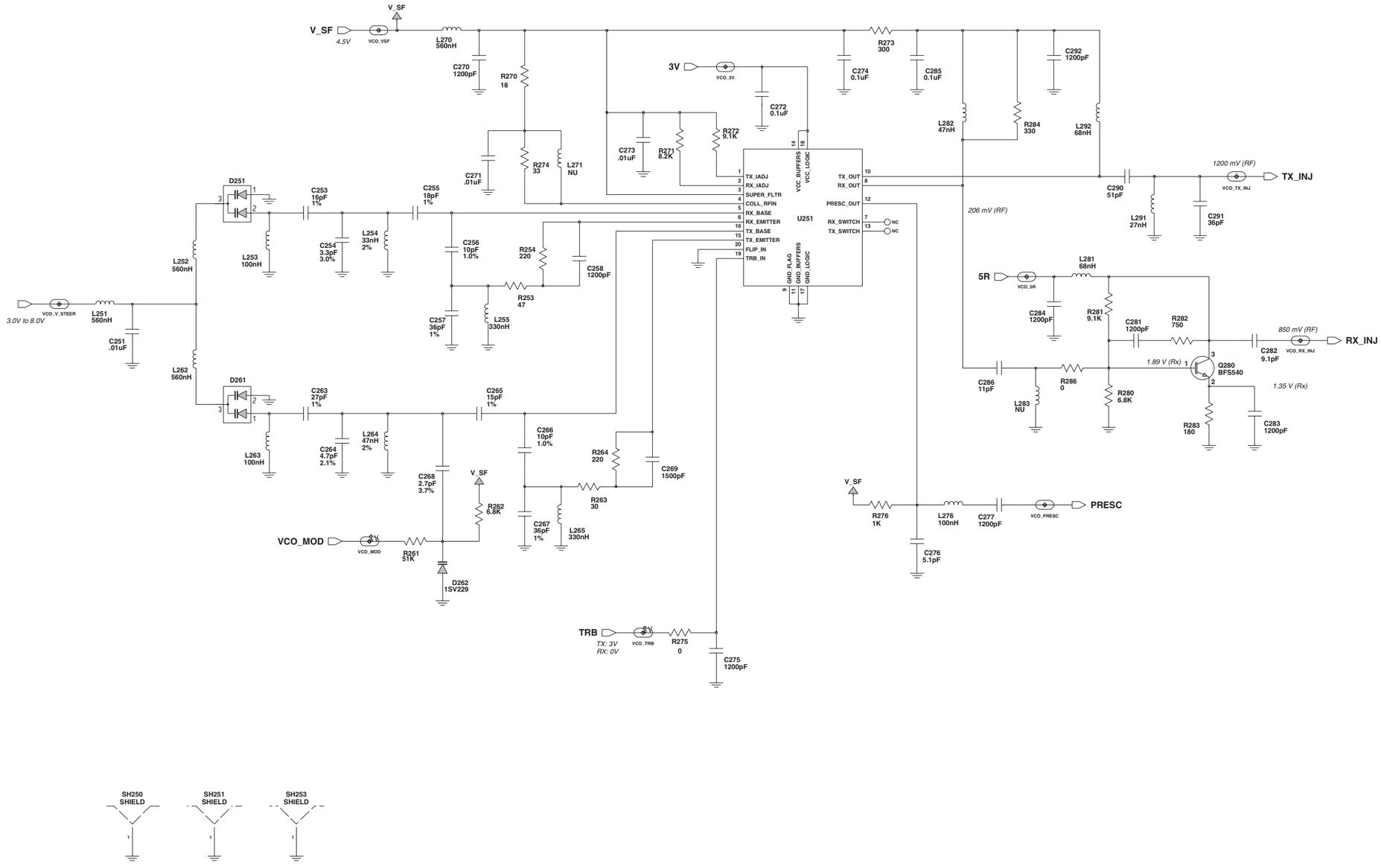


Figure 7-78. VHF (146–174 MHz) Voltage Controlled Oscillator Schematic Diagram (8486769Z04-C/05-D)

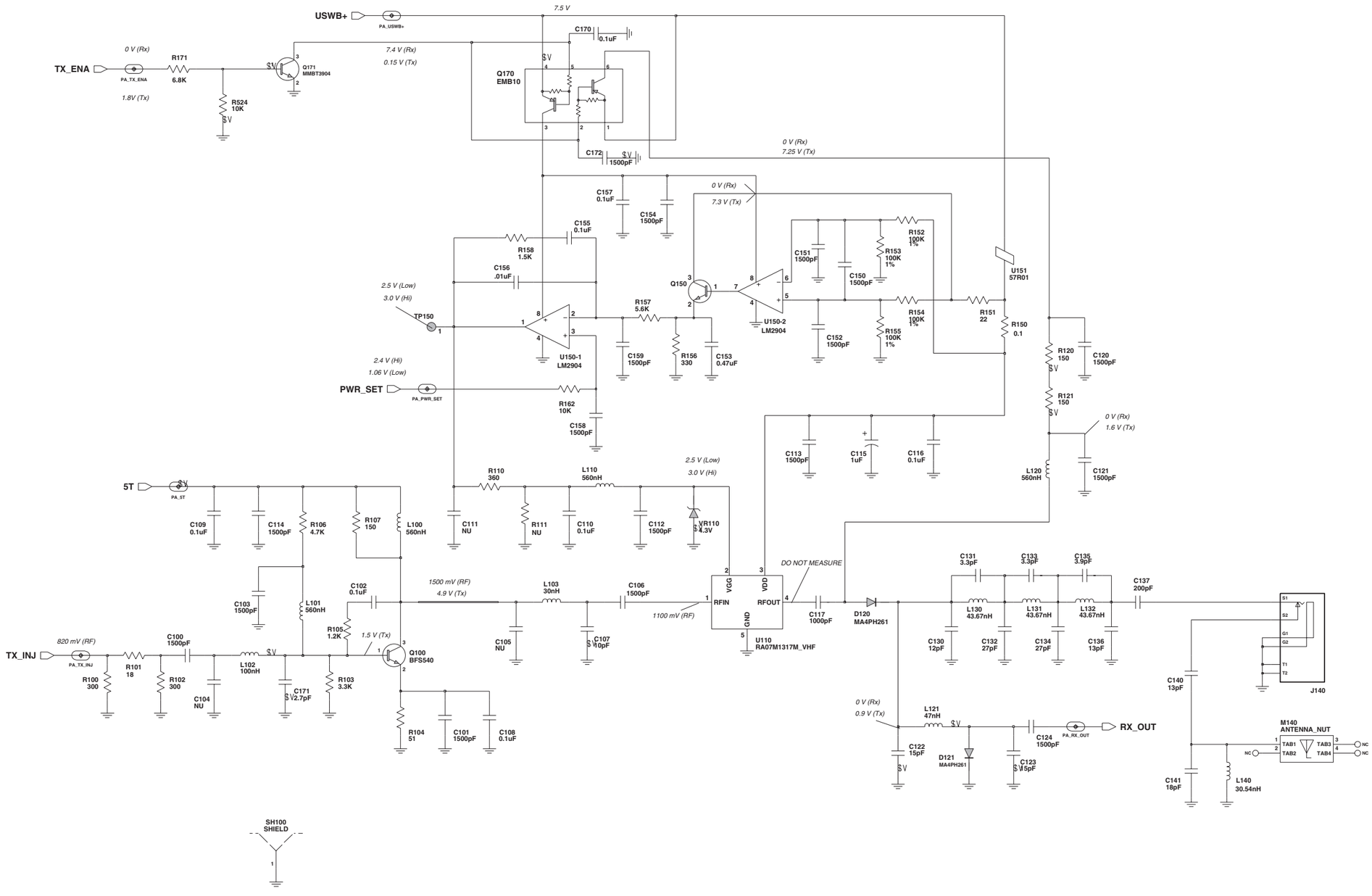


Figure 7-79. VHF (146–174 MHz) Transmitter and Power Control Schematic Diagram (8486769Z04-C/05-D)

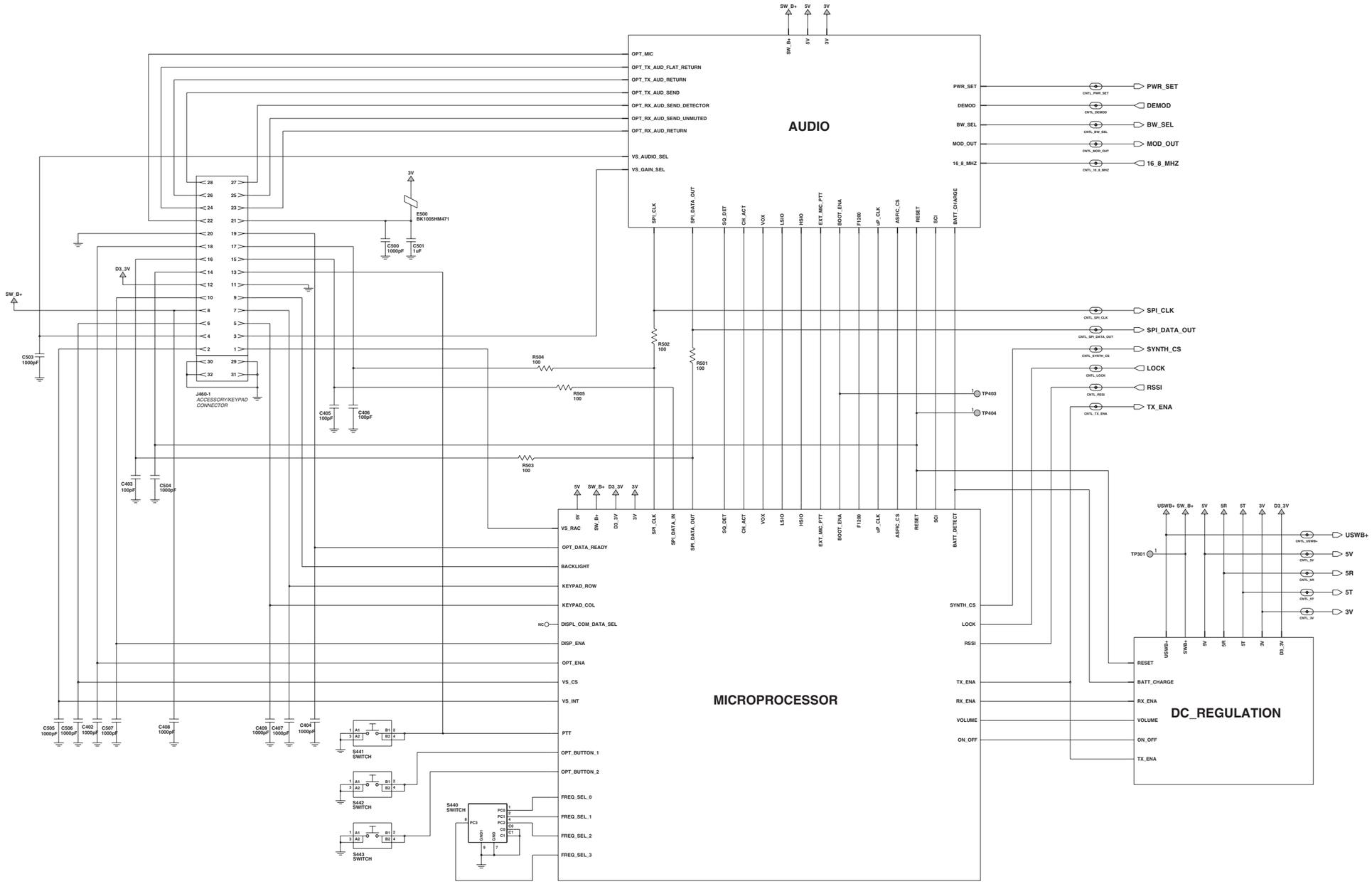


Figure 7-80. VHF (146–174 MHz) Controller Interconnect Schematic Diagram (8486769Z04-C/05-D)

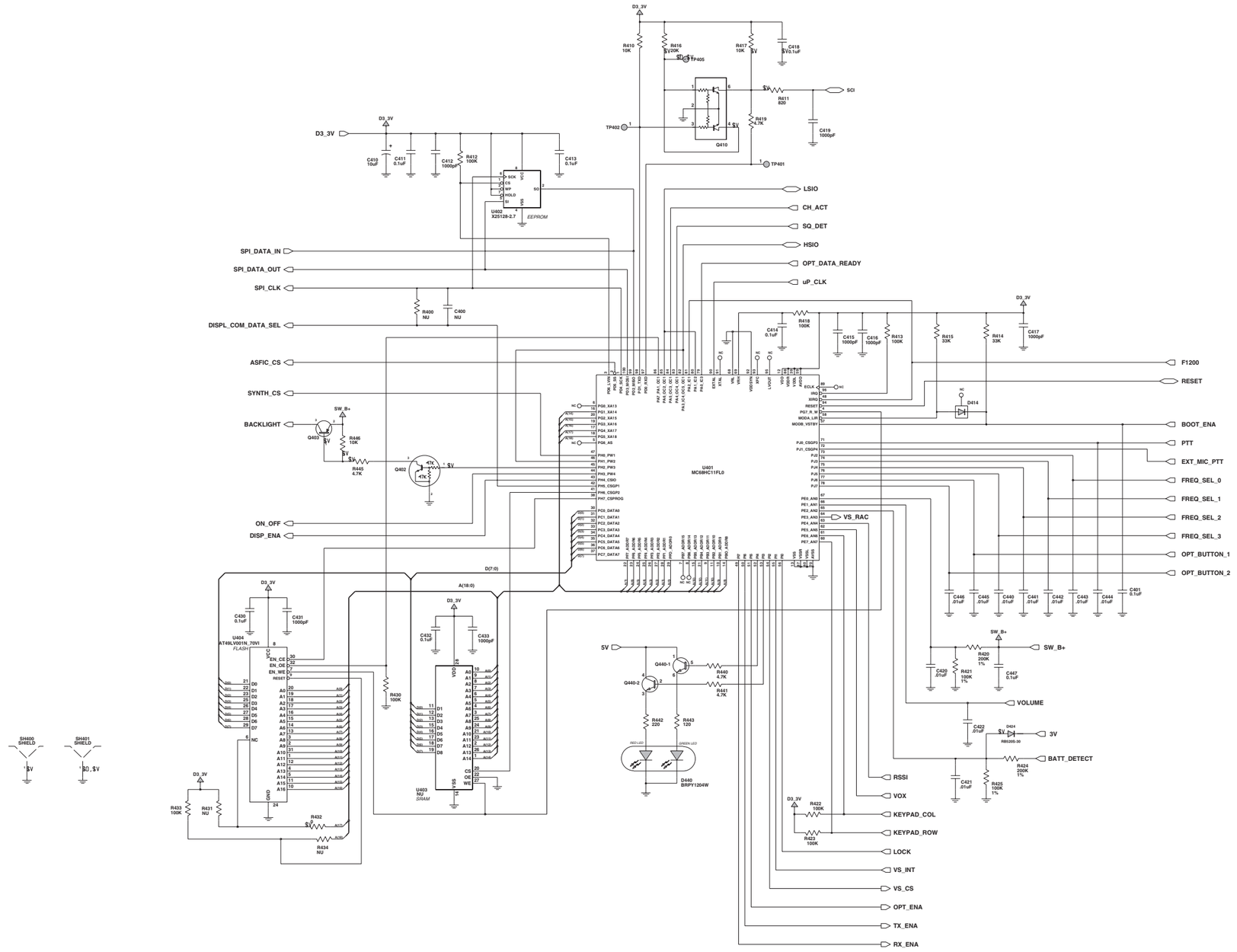


Figure 7-81. VHF (146–174 MHz) Microprocessor Circuitry Schematic Diagram (8486769Z04-C/05-D)

	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

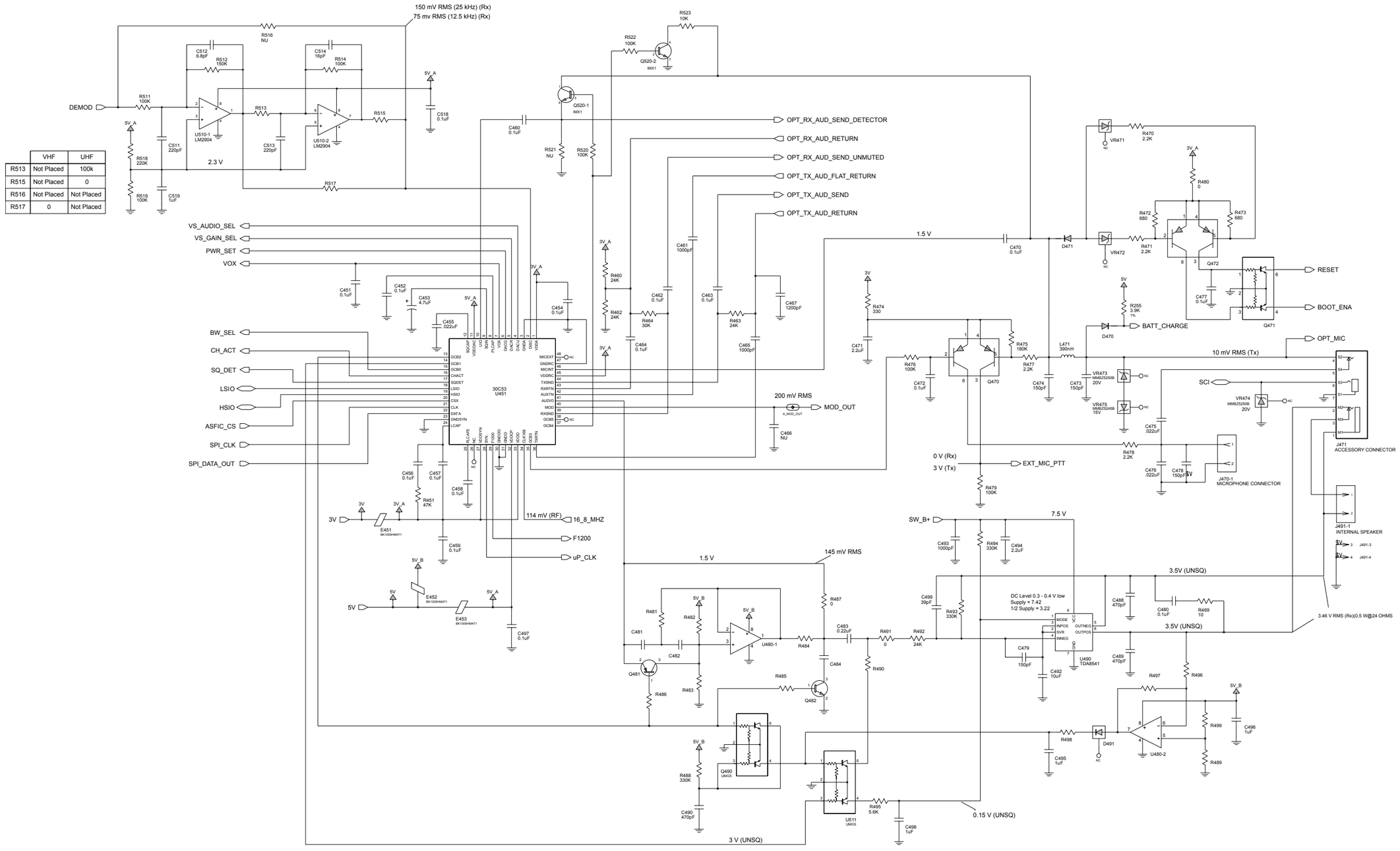


Figure 7-82. VHF (146–174 MHz) Audio Circuitry Schematic Diagram (8486769Z04-C/05-D)

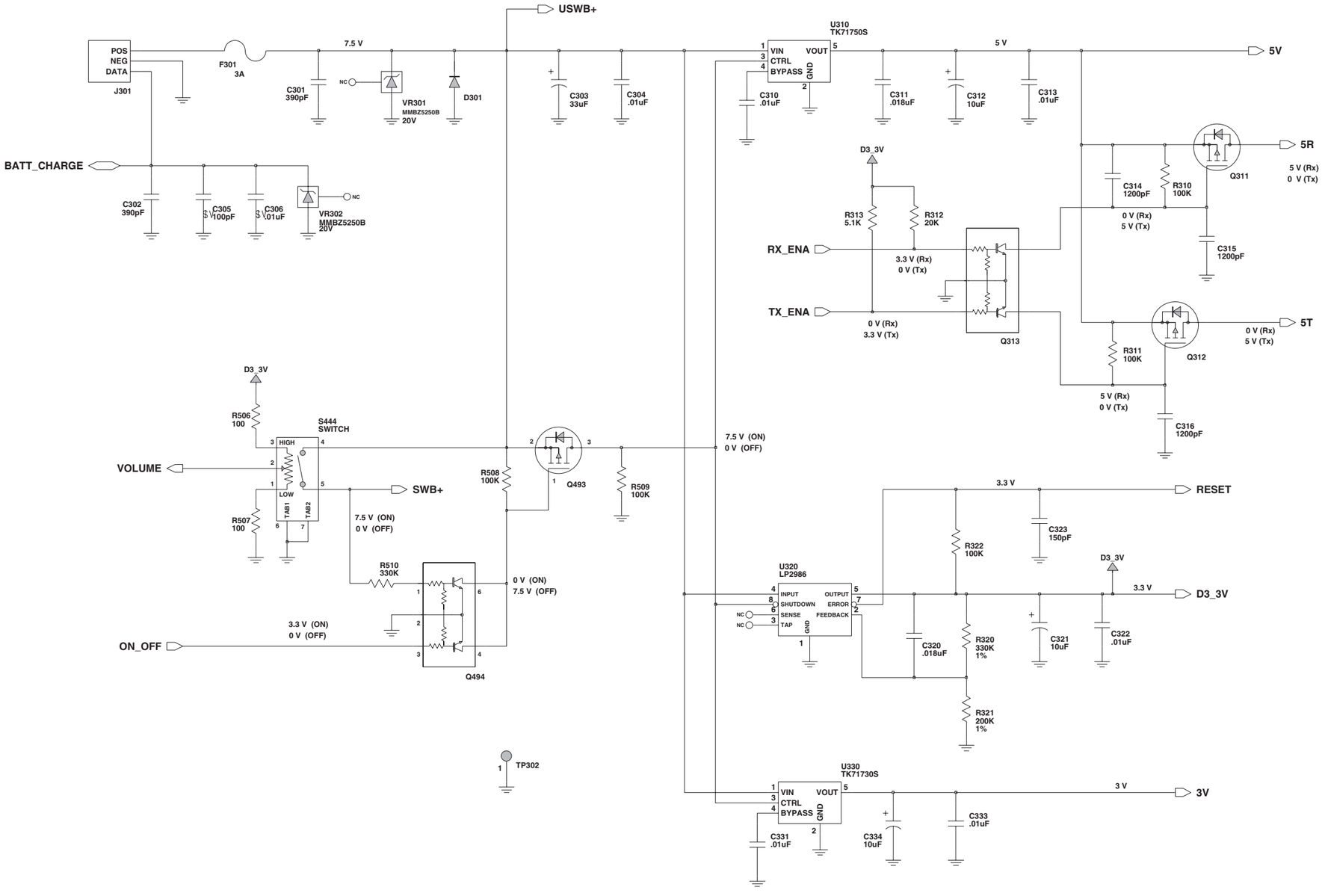
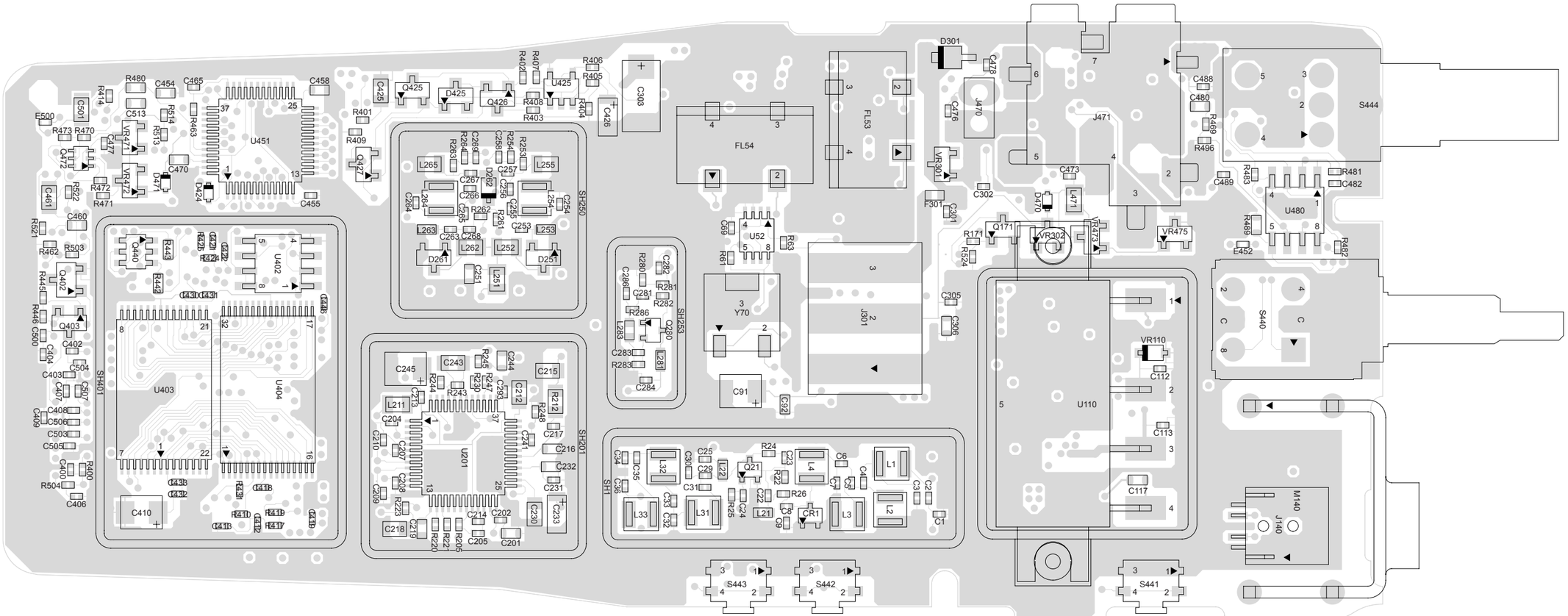


Figure 7-83. VHF (146–174 MHz) DC Regulation Schematic Diagram (8486769Z04-C/05-D)



ZMY30000-O

Figure 7-84. VHF (146–174 MHz) Board Component Side View (8486769Z04-C/05-D)

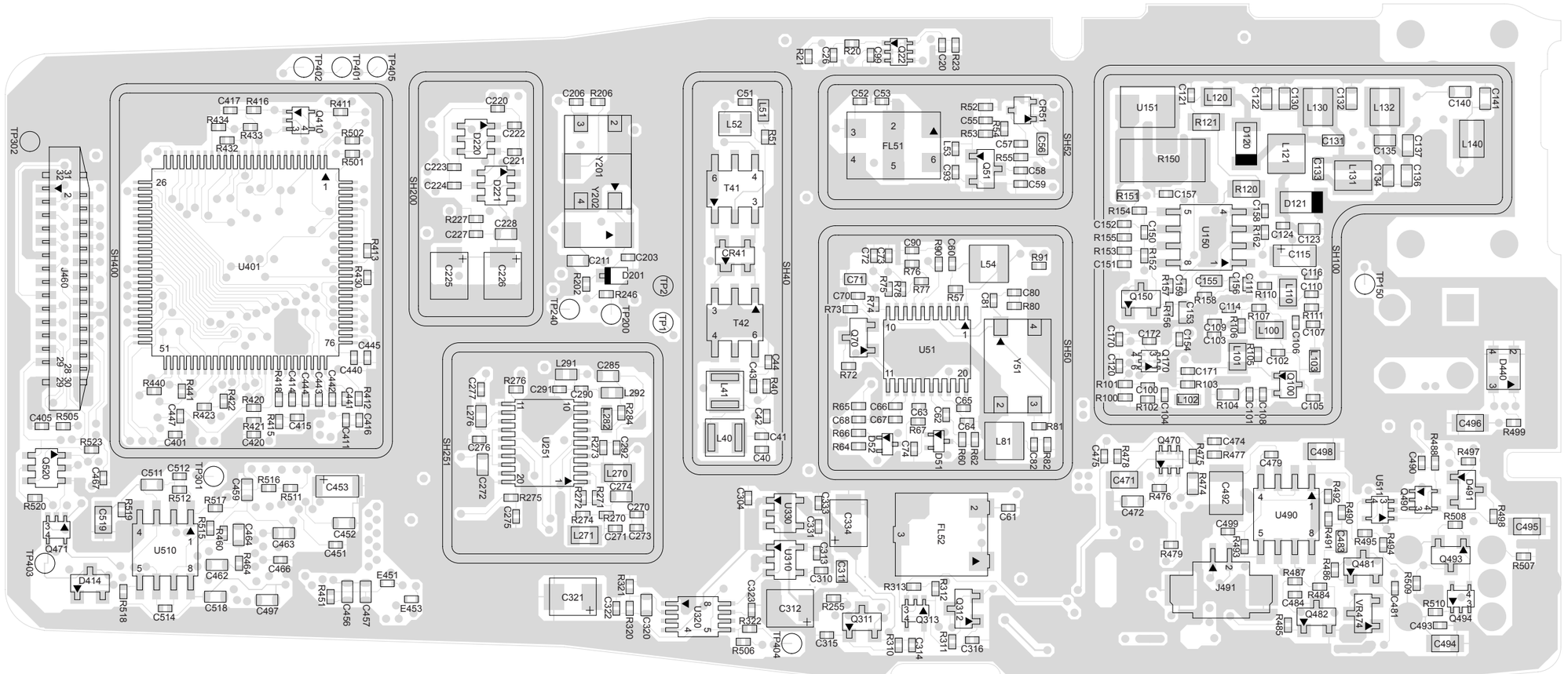


Figure 7-85. VHF (146–174 MHz) Board Solder Side View (8486769Z04-C/05-D)

VHF (146–174 MHz) Radio Parts List (8486769Z04-C)

Circuit Ref	Motorola Part No.	Description
C1	2115153H41	CAP, 22pF
C2	2115153H46	CAP, 36pF
C3	2115153H49	CAP, 47pF
C4	2115153H37	CAP, 15pF
C5	2115153H14	CAP, 3pF
C6	2115153H37	CAP, 15pF
C7	2115153H45	CAP, 33pF
C8	2115153H44	CAP, 30pF
C9	NOT PLACED	64AM DUMMY PART NUMBER
C20	2113945A09	CAP, 1000pF
C22	2113945A09	CAP, 1000pF
C23	2113945A09	CAP, 1000pF
C24	NOT PLACED	64AM DUMMY PART NUMBER
C25	2113945A09	CAP, 1000pF
C26	2113945A09	CAP, 1000pF
C29	2115153H27	CAP, 10pF
C30	2115153H42	CAP, 24pF
C31	2115153H44	CAP, 30pF
C32	2115153H51	CAP, 68pF
C33	2115153H42	CAP, 24pF
C34	2115153H51	CAP, 68pF
C35	2115153H43	CAP, 27pF
C36	2115153H42	CAP, 24pF
C40	2115153H40	CAP, 20pF
C41	2115153H37	CAP, 15pF
C42	2115153H46	CAP, 36pF
C43	2115153H37	CAP, 15pF
C44	2115153H40	CAP, 20pF
C51	2113944A38	CAP, 82pF
C52	2115153H39	CAP, 18pF
C53	2115153H26	CAP, 9.1pF
C55	2113946K02	CAP, 100000pF
C56	2113945C31	CAP, 0.10uF
C57	2113946K02	CAP, 100000pF
C58	2113944A15	CAP, 25pF
C59	2113944A11	CAP, 2.7pF
C60	2113946K02	CAP, 100000pF
C61	2113944A36	CAP, 68pF
C62	2113946K02	CAP, 100000pF
C63	2113946K02	CAP, 100000pF
C64	2113946K02	CAP, 100000pF
C65	2113946K02	CAP, 100000pF
C66	2113946K02	CAP, 100000pF
C67	2113946K02	CAP, 100000pF
C68	2113946K02	CAP, 100000pF
C69	2113946K02	CAP, 100000pF
C70	2113944A87	CAP, 130pF
C71	2113945C31	CAP, 0.10uF
C72	2113946K02	CAP, 100000pF
C73	2113945A13	CAP, 4700pF
C74	2113944A33	CAP, 47pF
C80	2115153H41	CAP, 22pF
C81	2115153H45	CAP, 33pF
C82	2115153H45	CAP, 33pF
C90	2113946K02	CAP, 100000pF
C91	2313960D07	CAP, 10uF
C92	2113945C31	CAP, 0.10uF
C93	NOT PLACED	64AM DUMMY PART NUMBER
C99	2113946K02	CAP, 100000pF
C100	2113945A10	CAP, 1500pF
C101	2113945A10	CAP, 1500pF
C102	2113946K02	CAP, 100000pF
C103	2113945A10	CAP, 1500pF
C104	NOT PLACED	64AM DUMMY PART NUMBER
C105	NOT PLACED	64AM DUMMY PART NUMBER
C106	2113945A10	CAP, 1500pF
C107	2113944A25	CAP, 10pF
C108	2113946K02	CAP, 100000pF
C109	2113946K02	CAP, 100000pF
C110	2113946K02	CAP, 100000pF
C111	NOT PLACED	64AM DUMMY PART NUMBER
C112	2113945A10	CAP, 1500pF
C113	2113945A10	CAP, 1500pF
C114	2113945A10	CAP, 1500pF
C115	2313960B01	CAP, 1uF
C116	2113946K02	CAP, 100000pF
C117	2113945L25	CAP, 1000pF
C120	2113945A10	CAP, 1500pF
C121	2113945A10	CAP, 1500pF
C122	2113944C32	CAP, 15pF
C123	2113944C32	CAP, 15pF
C124	2113945A10	CAP, 1500pF
C130	2113944C31	CAP, 12pF
C131	2113944C18	CAP, 3.3pF
C132	2113944C35	CAP, 27pF
C133	2113944C18	CAP, 3.3pF
C134	2113944C35	CAP, 27pF
C135	2113944C20	CAP, 3.9pF
C136	2113944C78	CAP, 13pF
C137	2113944C89	CAP, 20pF0
C140	2113944C78	CAP, 13pF
C141	2113944C33	CAP, 18pF
C150	2113945A10	CAP, 1500pF
C151	2113945A10	CAP, 1500pF
C152	2113945A10	CAP, 1500pF
C153	2113946L04	CAP, 0.47uF
C154	2113945A10	CAP, 1500pF
C155	2113945C31	CAP, 0.10uF
C156	2113945B02	CAP, 10000pF
C157	2113946K02	CAP, 100000pF
C158	2113945A10	CAP, 1500pF
C159	2113945A10	CAP, 1500pF
C170	2113946K02	CAP, 100000pF
C171	2113944A11	CAP, 2.7pF
C172	2113945A10	CAP, 1500pF
C201	2113944C02	CAP, 220pF
C202	2115153H52	CAP, 68pF
C203	2115153H13	CAP, 2.7pF
C204	2113945A05	CAP, 470pF
C205	NOT PLACED	64AM DUMMY PART NUMBER
C206	NOT PLACED	64AM DUMMY PART NUMBER
C207	2113945A05	CAP, 470pF
C208	2113945A05	CAP, 470pF
C209	2113945A05	CAP, 470pF
C210	2113945A05	CAP, 470pF
C211	2113945C31	CAP, 0.10uF
C212	2113946N03	CAP, 2.2uF
C213	2113945B02	CAP, 10000pF
C214	2113945A09	CAP, 1000pF
C215	2113946N03	CAP, 2.2uF
C216	2113945C31	CAP, 0.10uF
C217	2113945A09	CAP, 1000pF
C218	2113946N03	CAP, 2.2uF
C219	2113945C31	CAP, 0.10uF
C220	2113944A29	CAP, 22pF
C221	2113945B02	CAP, 10000pF
C222	2113945B02	CAP, 10000pF
C223	2113945B02	CAP, 10000pF
C224	2113945B02	CAP, 10000pF
C225	2313960D07	CAP, 10uF
C226	2313960D07	CAP, 10uF
C227	2113945A09	CAP, 1000pF
C228	2113945C31	CAP, 0.10uF
C230	2113946N03	CAP, 2.2uF
C231	2113945A09	CAP, 1000pF
C232	2113945C31	CAP, 0.10uF
C233	2313960B30	CAP, 4.7pF
C241	2113945A60	CAP, 1200pF
C243	2113945G91	CAP, 100000pF
C244	2113945L27	CAP, 1200pF
C245	2313960C26	KEMET CAP
C251	2113945L49	CAP, 1000pF
C253	2115153H38	CAP, 16pF
C254	2115153H15	CAP, 3.3
C255	2115153H39	CAP, 18pF
C256	2115153H27	CAP, 10pF
C257	2115153H46	CAP, 36pF
C258	2113945A60	CAP, 1200pF
C263	2115153H43	CAP, 27pF
C264	2115153H19	CAP, 4.7
C265	2115153H37	CAP, 15pF
C266	2115153H27	CAP, 10pF
C267	2115153H46	CAP, 36pF
C268	2115153H13	CAP, 2.7pF
C269	2113945A10	CAP, 1500pF
C270	2113945A60	CAP, 1200pF
C271	2113945B02	CAP, 10000pF
C272	2113945C31	CAP, 0.10uF
C273	2113945B02	CAP, 10000pF
C274	2113945C31	CAP, 0.10uF
C275	2113945A60	CAP, 1200pF
C276	2113944A18	CAP, 5.1pF
C277	2113945A60	CAP, 1200pF
C281	2113945A60	CAP, 1200pF
C282	2113944A24	CAP, 9.1pF
C283	2113945A60	CAP, 1200pF
C284	2113945A60	CAP, 1200pF
C285	2113945C31	CAP, 0.10uF
C286	2113944A77	CAP, 11pF
C290	2113944A85	CAP, 51pF
C291	2113944A83	CAP, 36pF
C292	2113945A60	CAP, 1200pF
C293	2113945A05	CAP, 470pF
C301	2113945A04	CAP, 390pF
C302	2113945A04	CAP, 390pF
C303	2313960F04	CAP, 33uF
C304	2113945B02	CAP, 10000pF
C305	2113944A40	CAP, 100pF
C306	2113945L49	CAP, 1000pF
C310	2113945B02	CAP, 10000pF
C311	2113743E05	CAP, 0.18uF
C312	2313960D07	CAP, 10uF
C313	2113945B02	CAP, 10000pF
C314	2113945A60	CAP, 1200pF
C315	2113945A60	CAP, 1200pF
C316	2113945A60	CAP, 1200pF
C320	2113743E05	CAP, 0.18uF
C321	2313960D07	CAP, 10uF
C322	2113945B02	CAP, 10000pF
C323	2113944A42	CAP, 150pF
C331	2113945B02	CAP, 10000pF
C333	2113945B02	CAP, 10000pF
C334	2313960D07	CAP, 10uF
C400	NOT PLACED	64AM DUMMY PART NUMBER

Circuit Ref	Motorola Part No.	Description
C401	2113946K02	CAP, 100000pF
C402	2113945A09	CAP, 1000pF
C403	2113944A40	CAP, 100pF
C404	2113945A09	CAP, 1000pF
C405	2113944A40	CAP, 100pF
C406	2113944A40	CAP, 100pF
C407	2113945A09	CAP, 1000pF
C408	2113945A09	CAP, 1000pF
C409	2113945A09	CAP, 1000pF
C410	2313960D07	CAP, 10uF
C411	2113946K02	CAP, 100000pF
C412	2113945A09	CAP, 1000pF
C413	2113946K02	CAP, 100000pF
C414	2113946K02	CAP, 100000pF
C415	2113945A09	CAP, 1000pF
C416	2113945A09	CAP, 1000pF
C417	2113945A09	CAP, 1000pF
C418	2113946K02	CAP, 100000pF
C419	2113945A09	CAP, 1000pF
C420	2113945B02	CAP, 10000pF
C421	2113945B02	CAP, 10000pF
C422	2113945B02	CAP, 10000pF
C425	2113946E02	CAP, 1uF
C426	2313960B01	CAP, 1uF
C430	2113946K02	CAP, 100000pF
C431	2113945A09	CAP, 1000pF
C432	2113946K02	CAP, 100000pF
C433	2113945A09	CAP, 1000pF
C440	2113945B02	CAP, 10000pF
C441	2113945B02	CAP, 10000pF
C442	2113945B02	CAP, 10000pF
C443	2113945B02	CAP, 10000pF
C444	2113945B02	CAP, 10000pF
C445	2113945B02	CAP, 10000pF
C446	2113945B02	CAP, 10000pF
C447	2113946K02	CAP, 100000pF
C451	2113946K02	CAP, 100000pF
C452	2113945C31	CAP, 0.10uF
C453	2313960B30	CAP, 4.7pF
C454	2113945C31	CAP, 0.10uF
C455	2113945B04	CAP, 22000pF
C456	2113945C31	CAP, 0.10uF
C457	2113945C31	CAP, 0.10uF
C458	2113945C31	CAP, 0.10uF
C459	2113945C31	CAP, 0.10uF
C460	2113945C31	CAP, 0.10uF
C461	2113946F03	CAP, 4.7uF
C462	2113945C31	CAP, 0.10uF
C463	2113945C31	CAP, 0.10uF
C464	2113945C31	CAP, 0.10uF
C465	2113945A09	CAP, 1000pF
C466	NOT PLACED	64AM DUMMY PART NUMBER
C467	2113945A60	CAP, 1200pF
C470	2113945C31	CAP, 0.10uF
C471	2113946N03	CAP, 2.2uF
C472	2113945C31	CAP, 0.10uF
C473	2113944A42	CAP, 150pF
C474	2113944A42	CAP, 150pF
C475	2113945B04	CAP, 22000pF
C476	2113945B04	CAP, 22000pF
C477	2113946K02	CAP, 100000pF
C478	2113944A42	CAP, 150pF
C479	2113944A42	CAP, 150pF
C480	2113945C31	CAP, 0.10uF
C481	NOT PLACED	64AM DUMMY PART NUMBER
C482	NOT PLACED	64AM DUMMY PART NUMBER
C483	2113946C02	CAP, 0.22uF
C484	NOT PLACED	64AM DUMMY PART NUMBER
C488	2113945A05	CAP, 470pF
C489	2113945A05	CAP, 470pF
C490	2113945A05	CAP, 470pF
C492	2113928J08	CAP, 10uF
C493	2113945A09	CAP, 1000pF
C494	2113946N03	CAP, 2.2uF
C495	2113946N02	CAP, 1uF
C496	2113946N02	CAP, 1uF
C497	2113945C31	CAP, 0.10uF
C498	2113946N02	CAP, 1uF
C499	2113944A32	CAP, 39pF
C500	2113945A09	CAP, 1000pF
C501	2113946N02	CAP, 1uF
C503	2113945A09	CAP, 1000pF
C504	2113945A09	CAP, 1000pF
C505	2113945A09	CAP, 1000pF
C506	2113945A09	CAP, 1000pF
C507	2113945A09	CAP, 1000pF
C511	2113944C02	CAP, 220pF
C512	2113944A21	CAP, 6.8pF
C513	2113944C02	CAP, 220pF
C514	2113944A79	CAP, 16pF
C518	2113945C31	CAP, 0.10uF
C519	2113946N02	CAP, 1uF
CR1	4813974A19	Diode Schottky
CR41	4815923H01	Diode Schottky
CR51	4813974A19	Diode Schottky
D51	4815047H01	Switching Diode
D52	4815047H01	Switching Diode
D120	4880973Z02	Pin Diode
D121	4880973Z02	Pin Diode
D201	4815072H01	Diode Varactor
D220	4815011H01	Diode Triple
D221	4815011H01	Diode Triple
D251	4813974A01	ISV 228
D261	4813974A01	ISV 228
D262	4885055Y01	Diode Varactor
D301	4815713H01	Diode Schottky
D414	4816064H01	RH29M19 LH
D424	4809924D29	Diode High Voltage
D425	4816064H01	RH29M19 LH
D440	4805729G49	Diode Red/Yel
D470	4809924D29	Diode High Voltage
D471	4809924D29	Diode High Voltage
D491	NOT PLACED	64AM DUMMY PART NUMBER
E451	2480640Z01	Ferrite Bead
E452	2480640Z01	Ferrite Bead
E453	2480640Z01	Ferrite Bead
E500	2480640Z01	Ferrite Bead
F301	6515076H01	Fuse Chip SMT
FL51	9186801Z01	OSC,XTAL 44.85MHZ
FL52	9180468V04	4 Element FLTR
FL53	9180469V05	6 Element FLTR
FL54	9115811H01	6 Element FLTR
J140	0986428Z02	RF Jack
J301	0986565Z02	Battery CONN
J460	NOT PLACED	64AM DUMMY PART NUMBER
J470	0985818A02	CONN 2 PIN
J471	0980683Z03	AUDIO JACK
J491	2815162H01	CONN_P
L1	2414015C09	INDCTR, 68nH
L2	2414015C09	INDCTR, 68nH
L3	2414015C09	INDCTR, 68nH
L4	2414015C09	INDCTR, 68nH
L21	NOT PLACED	64AM DUMMY PART NUMBER
L22	2414017N24	INDCTR, 100nH
L31	2414015C09	INDCTR, 68nH
L32	2414015C09	INDCTR, 68nH
L33	2414015C09	INDCTR, 68nH
L40	2414015C09	INDCTR, 68nH
L41	2414015C09	INDCTR, 68nH
L51	2414017N26	INDCTR, 150nH
L52	2414032F44	INDCTR, 680nH
L53	2113944A41	CAP, 120 pF
L54	2414015A25	INDCTR, 1200nH
L81	2414015A19	INDCTR, 1000nH
L100	2414017K32	INDCTR, 560nH
L101	2414017K32	INDCTR, 560nH
L102	2415429H36	INDCTR, 100nH
L103	2415429H25	INDCTR, 30nH
L110	2414017K32	INDCTR, 560nH
L120	2414017K32	INDCTR, 560nH
L121	2415015H01	INDCTR, 47nH
L130	2479990N01	INDCTR, 43.67nH
L131	2479990N01	INDCTR, 43.67nH
L132	2479990N01	INDCTR, 43.67nH
L140	2479990M01	INDCTR, 30.54nH
L211	2414017K32	INDCTR, 560nH
L251	2414017K32	INDCTR, 560nH
L252	2414017K32	INDCTR, 560nH
L253	2415429H36	INDCTR, 100nH
L254	2414015C05	INDCTR, 33nH
L255	2414017K29	INDCTR, 330nH
L262	2414017K32	INDCTR, 560nH
L263	2415429H36	INDCTR, 100nH
L264	2414015C07	INDCTR, 47nH
L265	2414017K29	INDCTR, 330nH
L270	2414017K32	INDCTR, 560nH
L271	NOT PLACED	64AM DUMMY PART NUMBER
L276	2414017N24	INDCTR, 100nH
L281	2414017N22	INDCTR, 68nH
L282	2414017N20	INDCTR, 47nH
L283	NOT PLACED	64AM DUMMY PART NUMBER
L291	2414017N17	INDCTR, 27nH
L292	2414017N22	INDCTR, 68nH
L471	2414017K30	INDCTR, 390nH
M140	0286427Z01	Nut, Antenna
Q21	4815119H01	Transistor
Q22	4815267H01	Transistor
Q51	4815343H01	Transistor
Q70	4815056H01	Transistor
Q100	4815119H01	Transistor
Q150	4815056H01	Transistor
Q170	4809939C34	Transistor
Q171	4815056H01	Transistor
Q280	4815119H01	TRANSISTOR
Q311	4815069H02	TP010IT
Q312	4815069H02	TP010IT
Q313	4815066H01	Transistor
Q402	4813973A42	Transistor
Q403	4813973A13	XSTR PNP40V
Q410	4815066H01	Transistor
Q425	4815069H02	TP010IT
Q426	4815069H02	TP010IT
Q427	4815069H02	TP010IT
Q440	4815154H01	Transistor
Q470	4815267H01	Transistor

Circuit Ref	Motorola Part No.	Description
Q471	4815066H01	Transistor
Q472	4815267H01	Transistor
Q481	NOT PLACED	64AM DUMMY PART NUMBER
Q482	NOT PLACED	64AM DUMMY PART NUMBER
Q490	4815066H01	Transistor
Q493	4815069H02	TP010IT
Q494	4815066H01	Transistor
Q520	4815154H01	Transistor
R20	0613952Z52	RES, 6.8K
R21	0613952Q49	RES, 100
R22	0613952Q93	RES, 6800
R23	0613952Z58	RES, 22K
R24	0613952Q70	RES, 750
R25	0613952Q91	RES, 5600
R26	0613952R66	RES, 0
R40	0613952Q73	RES, 1000
R51	0613952Q42	RES, 51
R52	0613952R03	RES, 12K
R53	0613952R13	RES, 33K
R54	0613952Q90	RES, 5100
R55	0613952Q61	RES, 330
R57	0613952Q89	RES, 4700
R60	0613952Q82	RES, 2400
R61	0613952R25	RES, 100K
R62	0613952Q85	RES, 3300
R63	0613952R15	RES, 39K
R64	0613952R08	RES, 20K
R65	0613952R15	RES, 39K
R66	0613952R08	RES, 20K
R67	0613952R08	RES, 20K
R72	0613952Q63	RES, 390
R73	0613952Q79	RES, 1800
R74	0613952Q75	RES, 1200
R75	0613952R03	RES, 12K
R76	0613952Z55	RES, 12K
R77	0613952Z53	RES, 8.2K
R78	0613952Q69	RES, 680
R80	0613952Q90	RES, 5100
R81	0613952Q73	RES, 1000
R82	NOT PLACED	64AM DUMMY PART NUMBER
R90	0613952Q42	RES, 51
R91	0613952Q78	RES, 1600
R100	0613952Q60	RES, 300
R101	0613952Q31	RES, 18
R102	0613952Q60	RES, 300
R103	0613952Q85	RES, 3300
R104	0613952H42	RES, 51
R105	0613952Q75	RES, 1200
R106	0613952Q89	RES, 4700
R107	0613952Q53	RES, 150
R110	0613952Q62	RES, 360
R111	0613952R01	RES, 10K
R120	0613958H53	RES, 150
R121	0613958H53	RES, 150
R150	0680539Z01	RES, 0.1
R151	0613952H33	RES, 22
R152	0613952P01	RES, 100K
R153	0613952P01	RES, 100K
R154	0613952P01	RES, 100K
R155	0613952P01	RES, 100K
R156	0613952Q61	RES, 330
R157	0613952Q91	RES, 5600
R158	0613952Q77	RES, 1500
R162	0613952R01	RES, 10K
R171	0613952Q93	RES, 6800
R202	0613952R29	RES, 150K
R205	0613952Q49	RES, 100
R206	NOT PLACED	64AM DUMMY PART NUMBER
R212	0613958J74	RES, 0
R220	0613952Q53	RES, 150
R221	0613952Q53	RES, 150
R223	0613952Q49	RES, 100
R227	0613952R29	RES, 150K
R230	0613952R26	RES, 110K
R243	0613952Q79	RES, 1800
R244	0613952Q42	RES, 51
R245	0613952Q77	RES, 1500
R246	0613952R25	RES, 100K
R247	0613952R30	RES, 160K
R248	0613952Q42	RES, 51
R253	0613952Q41	RES, 47
R254	0613952Q57	RES, 220
R255	0613952Z46	RES, 3.9K
R261	0613952R18	RES, 51K
R262	0613952Q93	RES, 6800
R263	0613952Q36	RES, 30
R264	0613952Q57	RES, 220
R270	0613952Q31	RES, 18
R271	0613952Q95	RES, 8200
R272	0613952Q96	RES, 9100 2
R273	0613952Q60	RES, 300
R274	0613952Q37	RES, 33
R275	0613952R66	RES, 0
R276	0613952Q73	RES, 1000
R280	0613952Q93	RES, 6800
R281	0613952Q96	RES, 9100 2
R282	0613952Q70	RES, 750
R283	0613952Q55	RES, 180
R284	0613952Q61	RES, 330
R286	0613952R66	RES, 0
R310	0613952R25	RES, 100K
R311	0613952R25	RES, 100K
R312	0613952R08	RES, 20K
R313	0613952Q90	RES, 5100
R320	0613952Z80	RES, 330K
R321	0613952P30	RES, 200K
R322	0613952R25	RES, 100K
R400	NOT PLACED	64AM DUMMY PART NUMBER
R401	0613952R36	RES, 300K
R402	0613952R01	RES, 10K
R403	0613952R01	RES, 10K
R404	0613952R18	RES, 51K
R405	0613952R36	RES, 300K
R406	0613952R33	RES, 220K
R407	0613952R25	RES, 100K
R408	0613952R25	RES, 100K
R409	0613952Q73	RES, 1000
R410	0613952R01	RES, 10K
R411	0613952Q71	RES, 820
R412	0613952R25	RES, 100K
R413	0613952R25	RES, 100K
R414	0613952R13	RES, 33K
R415	0613952R13	RES, 33K
R416	0613952R08	RES, 20K
R417	0613952R01	RES, 10K
R418	0613952R25	RES, 100K
R419	0613952Q89	RES, 4700
R420	0613952P30	RES, 200K
R421	0613952P01	RES, 100K
R422	0613952R25	RES, 100K
R423	0613952R25	RES, 100K
R424	0613952P30	RES, 200K
R425	0613952P01	RES, 100K
R430	0613952R25	RES, 100K
R431	NOT PLACED	64AM DUMMY PART NUMBER
R432	0613952R66	RES, 0
R433	0613952R25	RES, 100K
R434	NOT PLACED	64AM DUMMY PART NUMBER
R440	0613952Q89	RES, 4700
R441	0613952Q89	RES, 4700
R442	0613952H57	RES, 220
R443	0613952H51	CHIP RES 120
R445	0613952Q89	RES, 4700
R446	0613952R01	RES, 10K
R451	0613952R17	RES, 47K
R460	0613952R10	RES, 24K
R462	0613952R10	RES, 24K
R463	0613952R10	RES, 24K
R464	0613952R12	RES, 30K
R469	0613952Q25	RES, 10
R470	0613952Q81	RES, 2200
R471	0613952Q81	RES, 2200
R472	0613952Q69	RES, 680
R473	0613952Q69	RES, 680
R474	0613952H61	RES, 330
R475	0613952R31	RES, 180K
R476	0613952R25	RES, 100K
R477	0613952Q81	RES, 2200
R478	0613952Q81	RES, 2200
R479	0613952R25	RES, 100K
R480	0613952G67	RES, 0
R481	NOT PLACED	64AM DUMMY PART NUMBER
R482	NOT PLACED	64AM DUMMY PART NUMBER
R483	NOT PLACED	64AM DUMMY PART NUMBER
R484	NOT PLACED	64AM DUMMY PART NUMBER
R485	NOT PLACED	64AM DUMMY PART NUMBER
R486	NOT PLACED	64AM DUMMY PART NUMBER
R487	0613952R66	RES, 0
R488	0613952R37	RES, 330K
R489	NOT PLACED	64AM DUMMY PART NUMBER
R490	NOT PLACED	64AM DUMMY PART NUMBER
R491	0613952R66	RES, 0
R492	0613952R10	RES, 24K
R493	0613952R37	RES, 330K
R494	0613952Z80	RES, 330K
R495	0613952Q91	RES, 5600
R496	NOT PLACED	64AM DUMMY PART NUMBER
R497	NOT PLACED	64AM DUMMY PART NUMBER
R498	NOT PLACED	64AM DUMMY PART NUMBER
R499	NOT PLACED	64AM DUMMY PART NUMBER
R501	0613952Q49	RES, 100
R502	0613952Q49	RES, 100
R503	0613952Q49	RES, 100
R504	0613952Q49	RES, 100
R505	0613952Q49	RES, 100

Circuit Ref	Motorola Part No.	Description
R506	0613952Q49	RES, 100
R507	0613952Q49	RES, 100
R508	0613952R25	RES, 100K
R509	0613952R25	RES, 100K
R510	0613952R37	RES, 330K
R511	0613952R25	RES, 100K
R512	0613952R29	RES, 150K
R513	NOT PLACED	64AM DUMMY PART NUMBER
R514	0613952R25	RES, 100K
R515	NOT PLACED	64AM DUMMY PART NUMBER
R516	NOT PLACED	64AM DUMMY PART NUMBER
R517	0613952R66	RES, 0
R518	0613952R33	RES, 220K
R519	0613952R25	RES, 100K
R520	0613952R25	RES, 100K
R521	NOT PLACED	64AM DUMMY PART NUMBER
R522	0613952R25	RES, 100K
R523	0613952R01	RES, 10K
R524	0613952R01	RES, 10K
S440	4080710Z24	Switch
	4080710Z26	Switch
S441	4070354A01	Switch
S442	4070354A01	Switch
S443	4070354A01	Switch
S444	1880619Z04	Potentiometer
SH1	2686421Z02	Shield
SH40	2686419Z02	Shield
SH50	2686423Z02	Shield
SH52	2686424Z02	Shield
SH100	2686418Z02	Shield
SH200	2686424Z02	Shield
SH201	2686423Z02	Shield
SH250	2686425Z02	Shield
SH251	2686425Z02	Shield
SH253	2686422Z02	Shield
SH400	2686420Z03	Shield
SH401	2686420Z03	Shield
T41	2515121H01	Balun Transformer
T42	2515121H01	Balun Transformer
U51	5115281H01	SA616
U52	5115070H01	TC7W04FU
U110	0178034A01	PA Module
U150	5114005A01	LM2904DR
U151	2415954H01	INDCTR Bead
U201	5185177Y01	AT25016
U251	5105750U56	VCO Buffer IC
U310	5115746H01	Voltage Regulator

Circuit Ref	Motorola Part No.	Description
U320	5115679H01	Voltage Regulator
U330	5115745H01	Voltage Regulator
U401	5185143E03	68HC11FLO
U402	5115033H01	EEPROM IC
U403	NOT PLACED	64AM DUMMY PART NUMBER
U404	5115032H01	Flash 128K
U425	5115697H01	OP AMP
U451	5115062H01	IC ASFIC_CMP_R1
U480	NOT PLACED	64AM DUMMY PART NUMBER
U490	9115811H03	Audio Amplifier
U510	5114005A01	LM2904DR
U511	4815066H01	Transistor
VR110	4813977A55	Diode Zener
VR301	4813977M29	Diode 20V
VR302	4813977M29	Diode 20V
VR471	4813977M14	Diode 6.8V
VR472	4813977M05	Diode 3.3V
VR473	4813977M29	Diode 20V
VR474	4813977M29	Diode 20V
VR475	4813977M24	Diode Zener
Y51	4802245J84	XTAL 44.395MHz
Y70	9186145B02	CDBCA455CX36-TC
Y201	4880114R06	Crystal 16.8MHZ
Y202	NOT PLACED	64AM DUMMY PART NUMBER

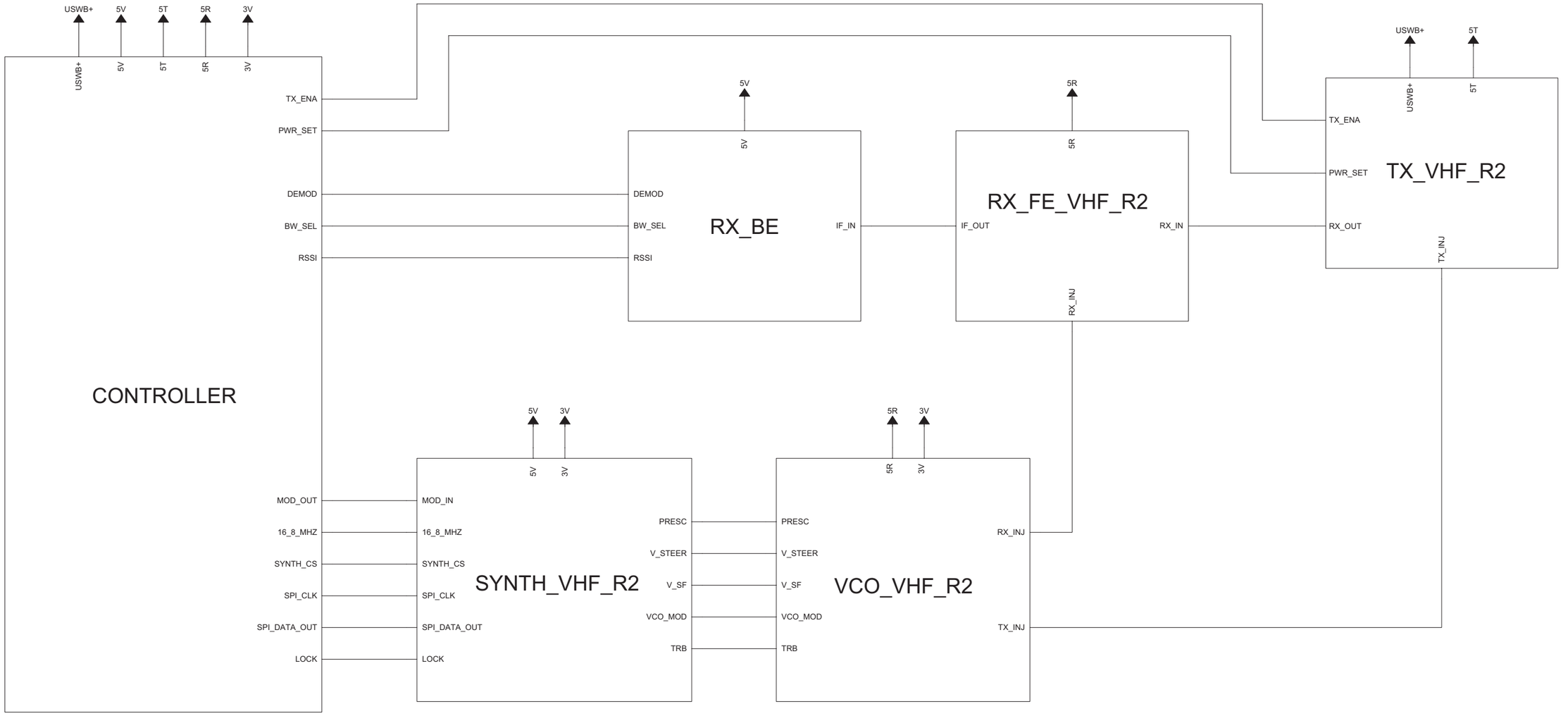


Figure 7-86. VHF (146–174 MHz) Radio Circuit Block Interconnect Diagram (8486769Z06-E)

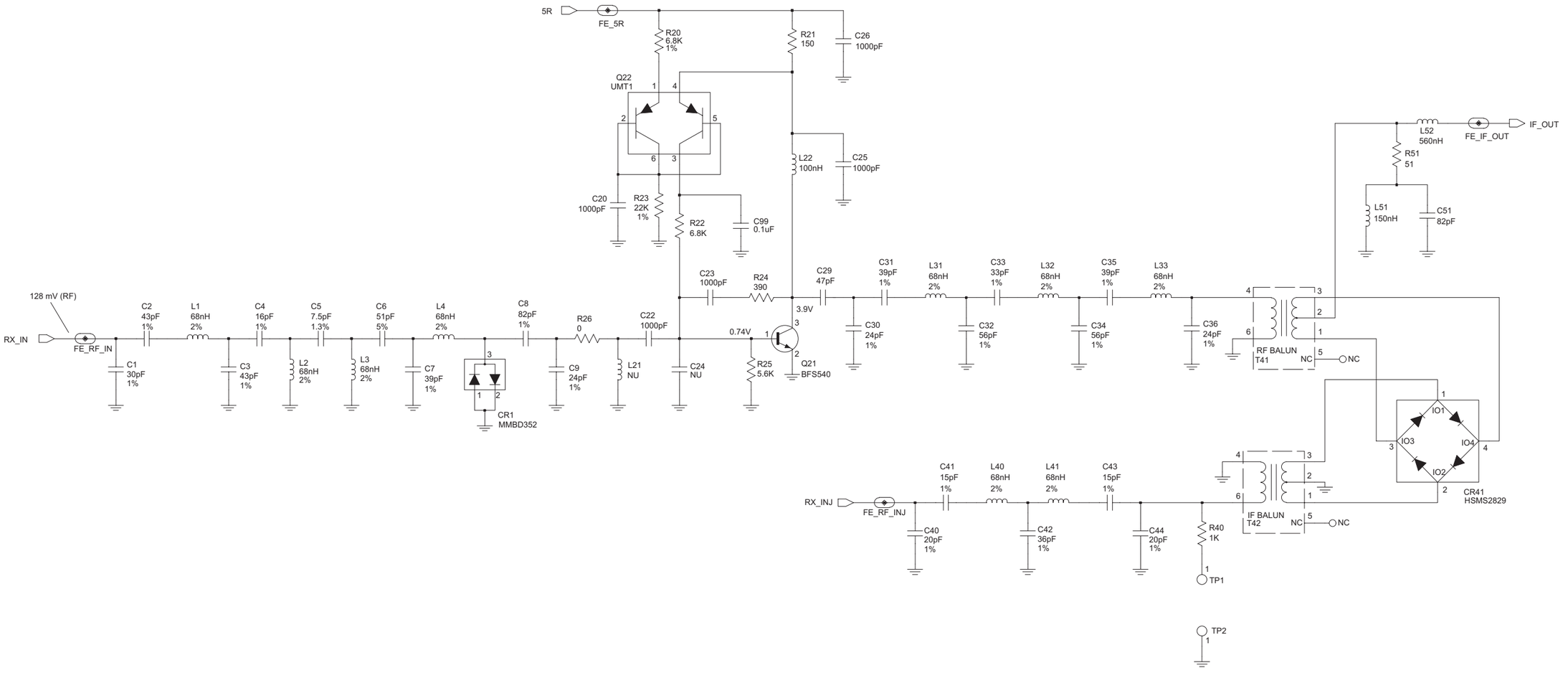


Figure 7-87. VHF (146–174 MHz) Receiver Front End Schematic Diagram (8486769Z06-E)

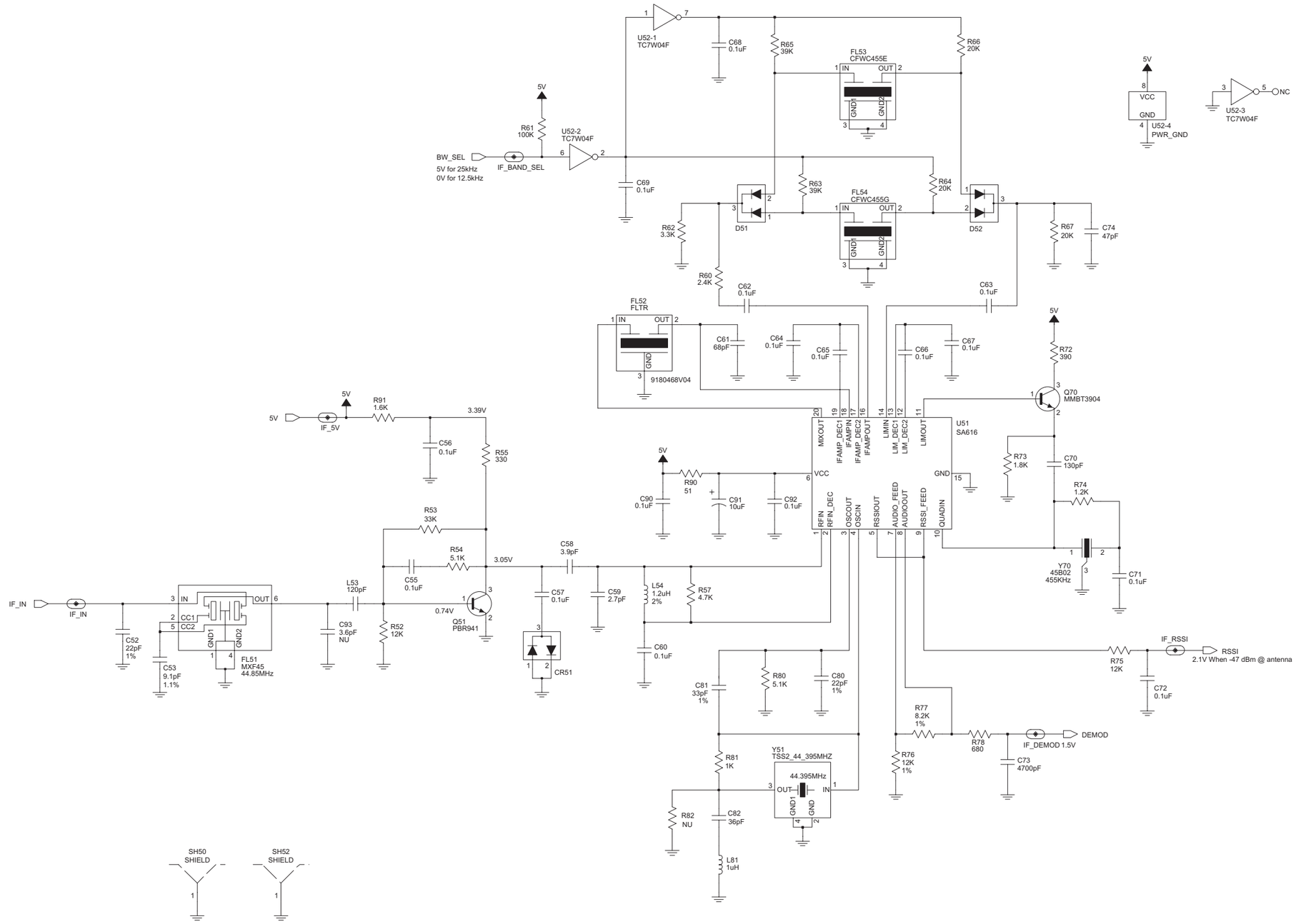
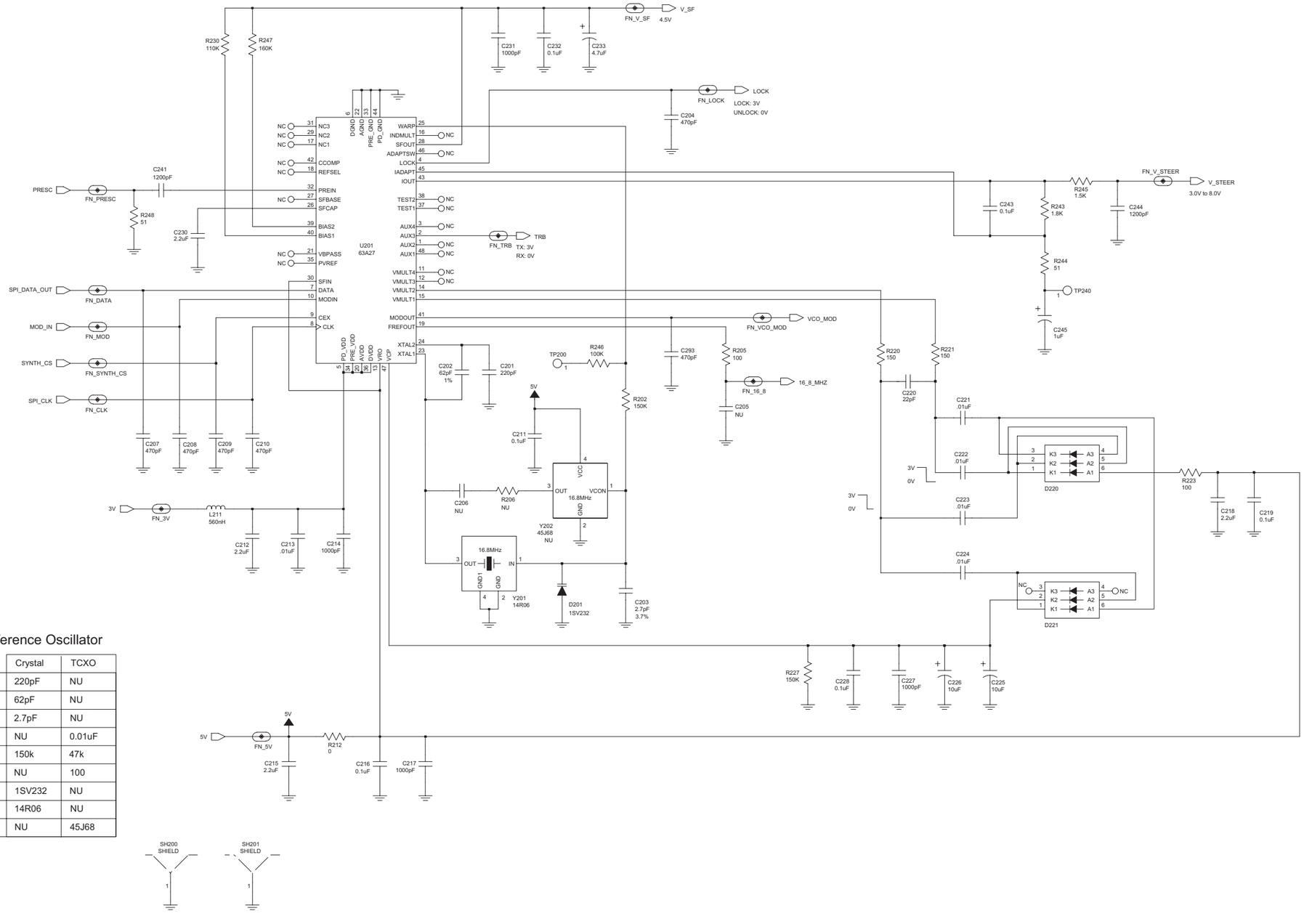


Figure 7-88. VHF (146–174 MHz) Receiver Back End Schematic Diagram (8486769Z06-E)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 7-89. VHF (146–174 MHz) Synthesizer Schematic Diagram (8486769Z06-E)

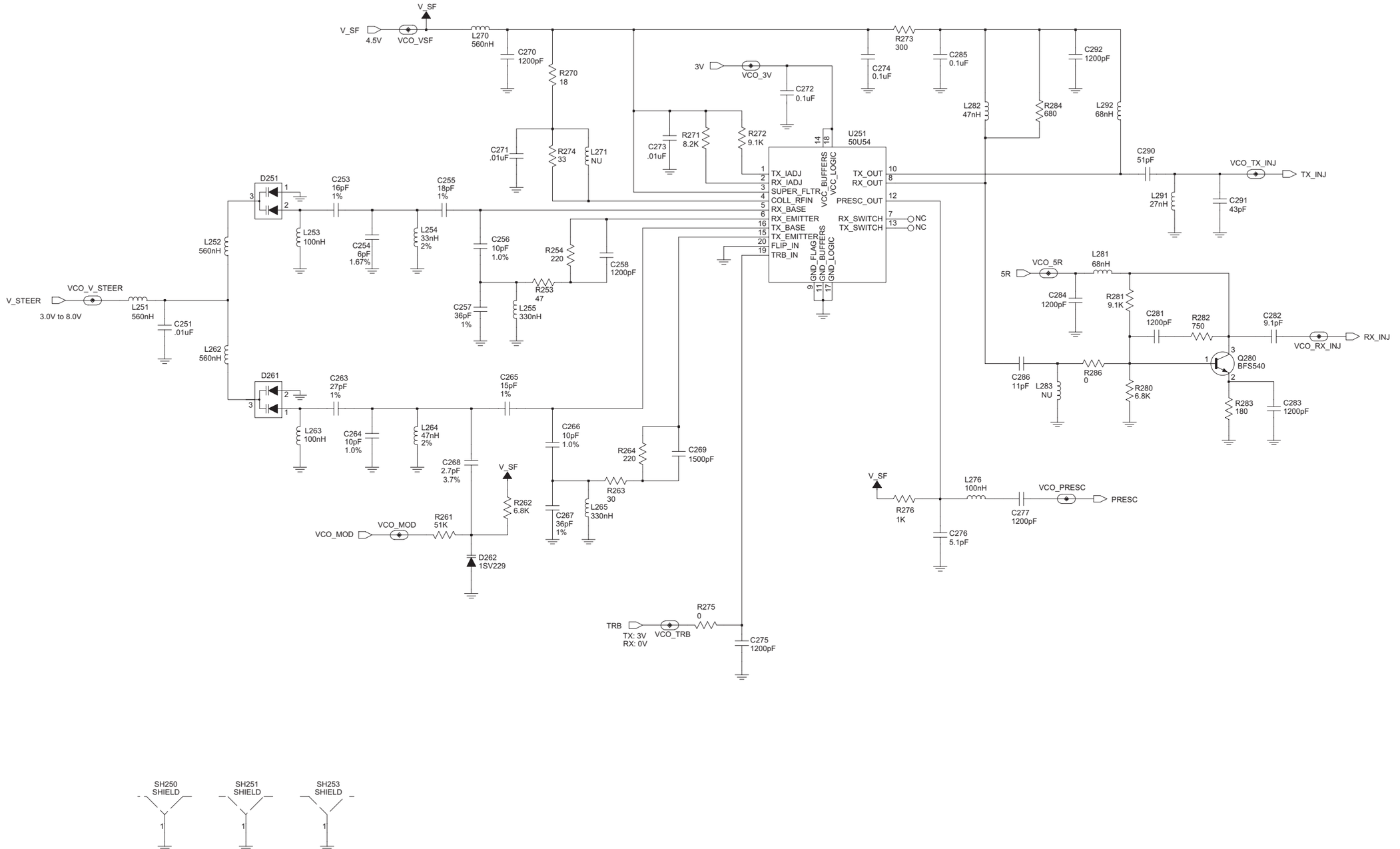


Figure 7-90. VHF (146–174 MHz) Voltage Controlled Oscillator Schematic Diagram (8486769Z06-E)

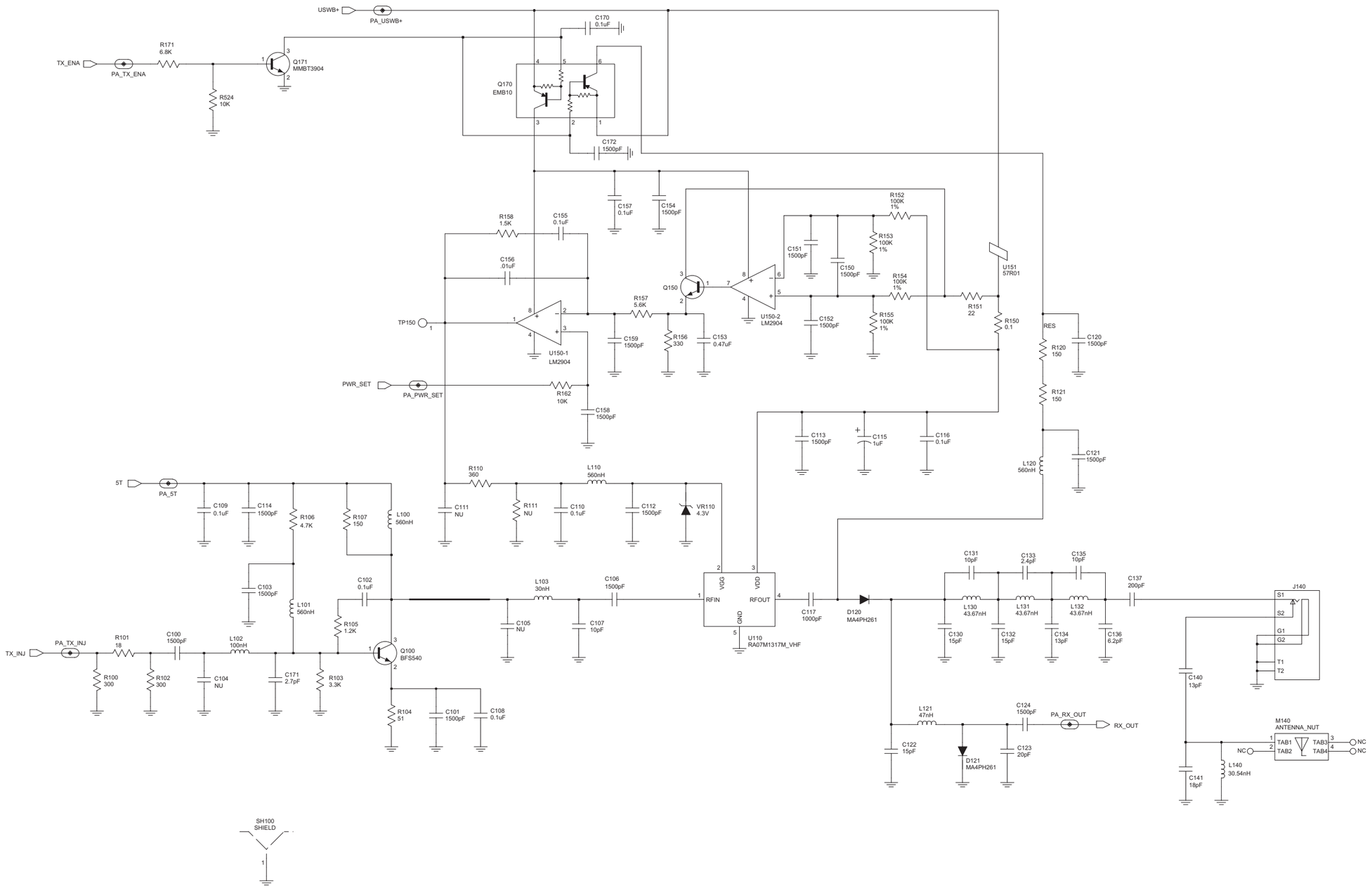


Figure 7-91. VHF (146–174 MHz) Transmitter and Power Control Schematic Diagram (8486769Z06-E)

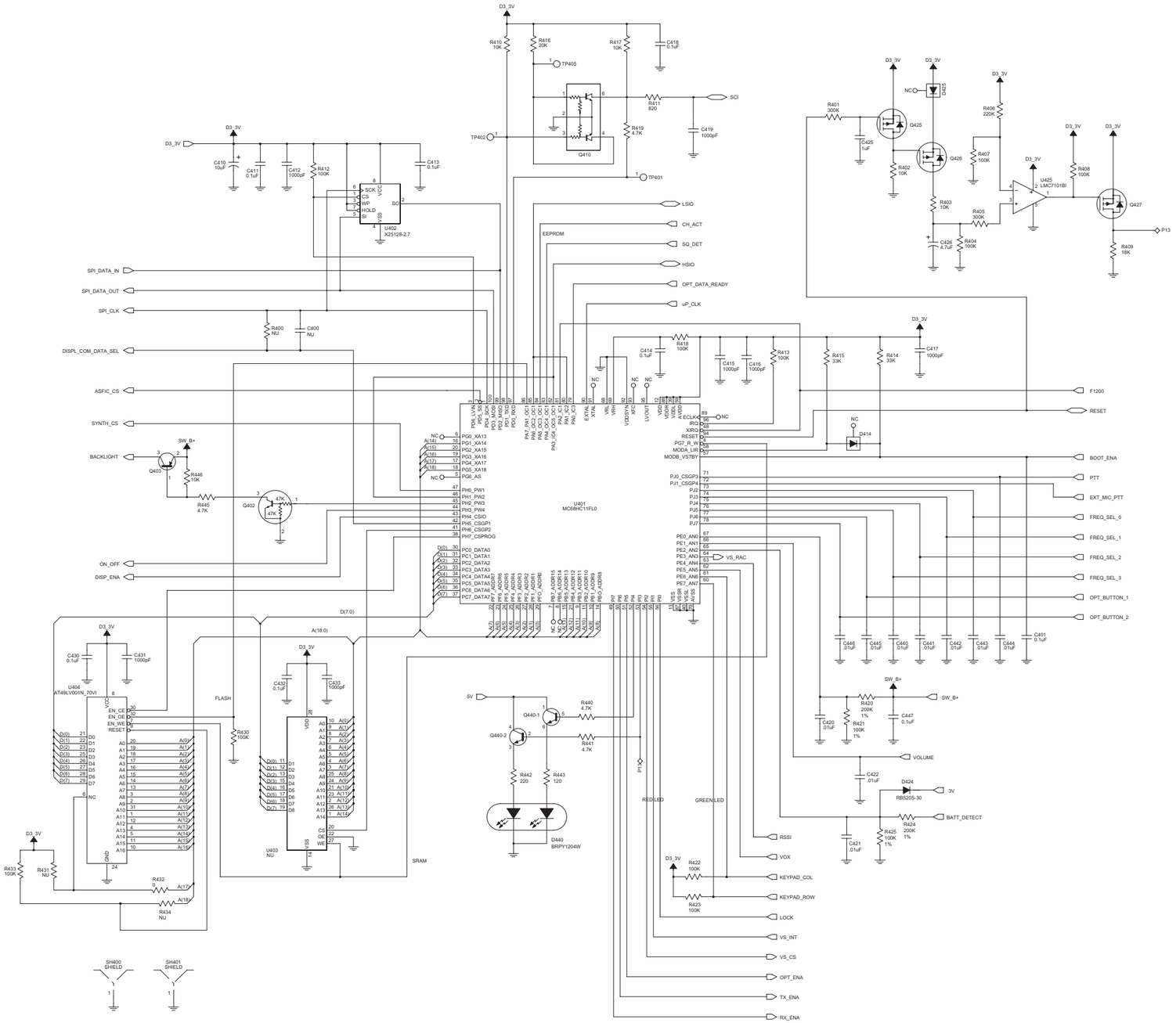


Figure 7-92. VHF (146–174 MHz) Microprocessor Circuitry Schematic Diagram (8486769Z06-E)

	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

Figure 7-93. VHF (146–174 MHz) Audio Circuitry Schematic Diagram (8486769Z06-E)

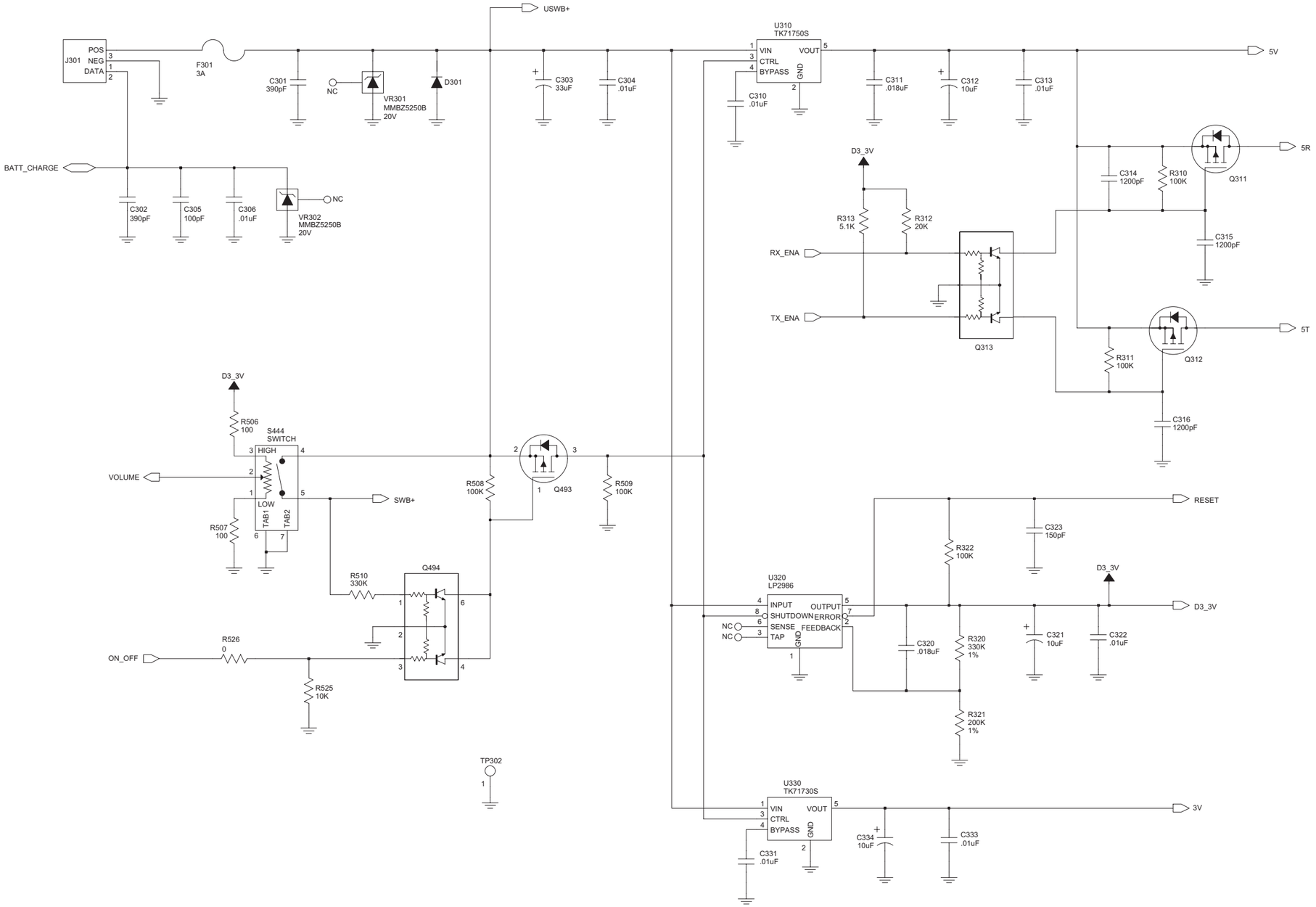


Figure 7-94. VHF (146–174 MHz) DC Regulation Schematic Diagram (8486769Z06-E)

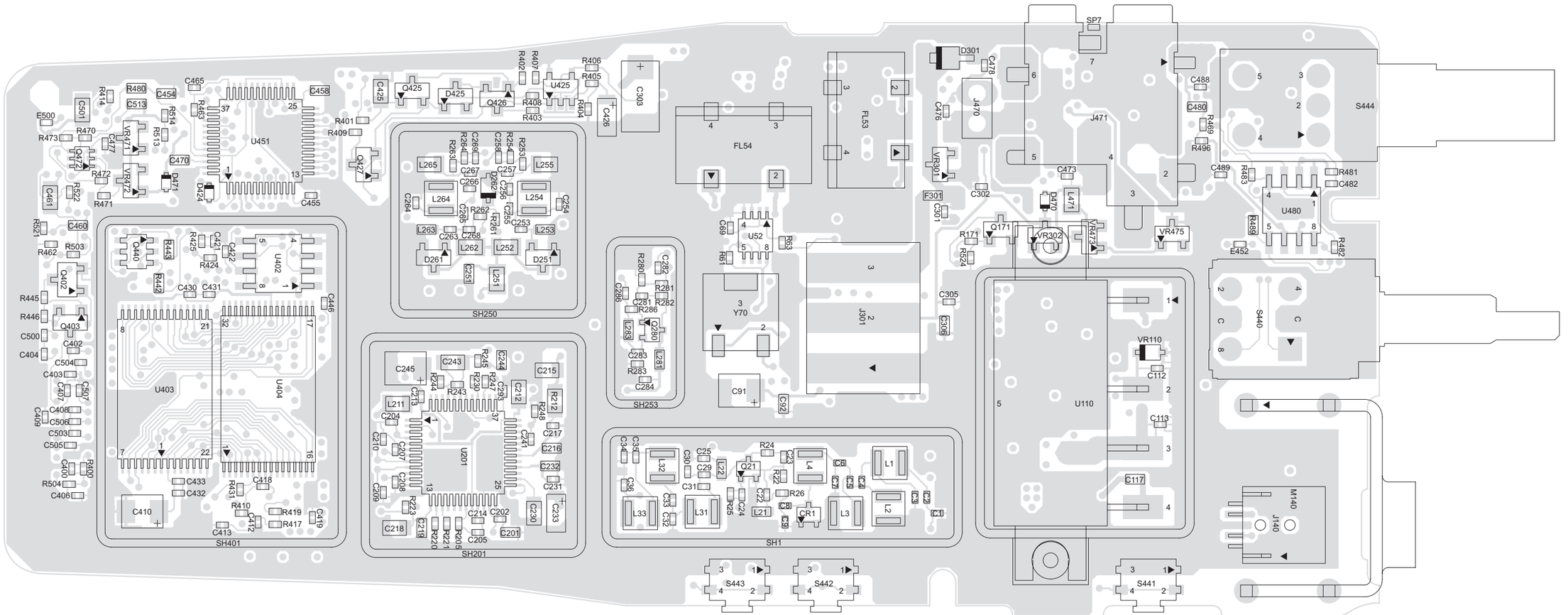


Figure 7-95. VHF (146–174 MHz) Board Component Side View (8486769Z06-E)

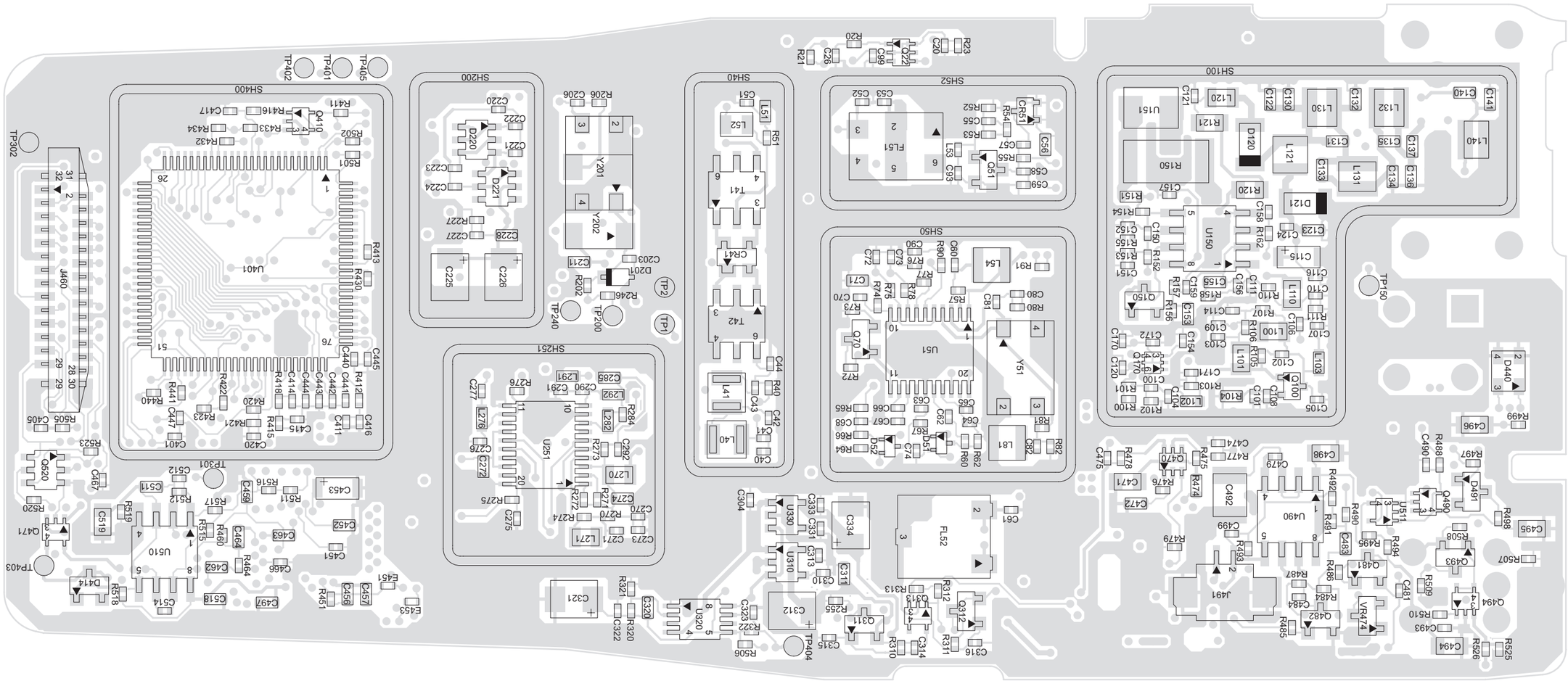


Figure 7-96. VHF (146–174 MHz) Board Solder Side View (8486769Z06-E)

VHF (146–174 MHz) Radio Parts List (8486769Z06-E)

Circuit Ref	Motorola Part No.	Description
C1	2115153H41	CAP,CERAMIC CHIP, 22PF, +1%,-1%,50V-
C2	2115153H46	CAP, CERAMIC, COG
C3	2115153H49	CAP, CERAMIC, COG
C4	2115153H37	CAP, CERAMIC, COG
C5	2115153H14	CAP, CERAMIC, COG
C6	2115153H37	CAP, CERAMIC, COG
C7	2115153H45	CAP, CERAMIC, COG
C8	2115153H44	CAP, CERAMIC, COG
C9	NOT PLACED	64AM DUMMY PART NUMBER
C20	2113945A09	CAP CER CHP 1000PF 50V 10%
C22	2113945A09	CAP CER CHP 1000PF 50V 10%
C23	2113945A09	CAP CER CHP 1000PF 50V 10%
C24	NOT PLACED	64AM DUMMY PART NUMBER
C25	2113945A09	CAP CER CHP 1000PF 50V 10%
C26	2113945A09	CAP CER CHP 1000PF 50V 10%
C29	2115153H27	CAP, CERAMIC, COG
C30	2115153H42	CAP, CERAMIC, COG
C31	2115153H44	CAP, CERAMIC, COG
C32	2115153H51	CAP, CERAMIC, COG
C33	2115153H42	CAP, CERAMIC, COG
C34	2115153H51	CAP, CERAMIC, COG
C35	2115153H43	CAP, CERAMIC, COG
C36	2115153H42	CAP, CERAMIC, COG
C40	2115153H40	CAP, CERAMIC, COG
C41	2115153H37	CAP, CERAMIC, COG
C42	2115153H46	CAP, CERAMIC, COG
C43	2115153H37	CAP, CERAMIC, COG
C44	2115153H40	CAP, CERAMIC, COG
C51	2113944A38	CAP CER CHP 82.0PF 50V 5%
C52	2115153H39	CAP, CERAMIC, COG
C53	2115153H26	CAP, CERAMIC, COG
C55	2113946K02	CAP CER CHP 0.10UF 16V
C56	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C57	2113946K02	CAP CER CHP 0.10UF 16V
C58	2113944A15	CAP CER CHP 3.9PF 50V +/- 0.25PF
C59	2113944A11	CAP CER CHP 2.7PF 50V +/- 0.25PF
C60	2113946K02	CAP CER CHP 0.10UF 16V
C61	2113944A36	CAP CER CHP 68.0PF 50V 5%
C62	2113946K02	CAP CER CHP 0.10UF 16V
C63	2113946K02	CAP CER CHP 0.10UF 16V
C64	2113946K02	CAP CER CHP 0.10UF 16V
C65	2113946K02	CAP CER CHP 0.10UF 16V
C66	2113946K02	CAP CER CHP 0.10UF 16V
C67	2113946K02	CAP CER CHP 0.10UF 16V
C68	2113946K02	CAP CER CHP 0.10UF 16V
C69	2113946K02	CAP CER CHP 0.10UF 16V
C70	2113944A87	CAP,FXD,130PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,P
C71	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C72	2113946K02	CAP CER CHP 0.10UF 16V
C73	2113945A13	CAP CER CHP 4700PF 50V 10%
C74	2113944A33	CAP CER CHP 47.0PF 50V 5%
C80	2115153H41	CAP,CERAMIC CHIP, 22PF, +1%,-1%,50V-
C81	2115153H45	CAP, CERAMIC, COG
C82	2115153H45	CAP, CERAMIC, COG
C90	2113946K02	CAP CER CHP 0.10UF 16V
C91	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C92	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C93	NOT PLACED	64AM DUMMY PART NUMBER
C99	2113946K02	CAP CER CHP 0.10UF 16V
C100	2113945A10	CAP CER CHP 1500PF 50V 10%
C101	2113945A10	CAP CER CHP 1500PF 50V 10%
C102	2113946K02	CAP CER CHP 0.10UF 16V
C103	2113945A10	CAP CER CHP 1500PF 50V 10%
C104	NOT PLACED	64AM DUMMY PART NUMBER
C105	NOT PLACED	64AM DUMMY PART NUMBER
C106	2113945A10	CAP CER CHP 1500PF 50V 10%
C107	2113944A25	CAP CER CHP 10.0PF 50V +/- 0.5PF
C108	2113946K02	CAP CER CHP 0.10UF 16V
C109	2113946K02	CAP CER CHP 0.10UF 16V
C110	2113946K02	CAP CER CHP 0.10UF 16V
C111	NOT PLACED	64AM DUMMY PART NUMBER
C112	2113945A10	CAP CER CHP 1500PF 50V 10%
C113	2113945A10	CAP CER CHP 1500PF 50V 10%
C114	2113945A10	CAP CER CHP 1500PF 50V 10%
C115	2313960B01	CAP,FXD,1UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,87MA,E
C116	2113946K02	CAP CER CHP 0.10UF 16V
C117	2113945L25	CAP,FXD,1000PF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C120	2113945A10	CAP CER CHP 1500PF 50V 10%
C121	2113945A10	CAP CER CHP 1500PF 50V 10%
C122	2113944C32	CAP CER CHP 15.0PF 50V 5%
C123	2113944C32	CAP CER CHP 15.0PF 50V 5%
C124	2113945A10	CAP CER CHP 1500PF 50V 10%
C130	2113944C31	CAP CER CHP 12.0PF 50V 5%
C131	2113944C18	CAP CER CHP 3.3PF 50V +/- 0.25PF
C132	2113944C35	CAP CER CHP 27.0PF 50V 5%
C133	2113944C18	CAP CER CHP 3.3PF 50V +/- 0.25PF
C134	2113944C35	CAP CER CHP 27.0PF 50V 5%
C135	2113944C20	CAP CER CHP 3.9PF 50V +/- 0.25PF
C136	2113944C78	CAP,FXD,13PF,+5%,-5%, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX,PB
C137	2113944C89	CAP,FXD,200PF,+5%,-5%, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX,P
C140	2113944C78	CAP,FXD,13PF,+5%,-5%, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX,PB
C141	2113944C33	CAP CER CHP 18.0PF 50V 5%
C150	2113945A10	CAP CER CHP 1500PF 50V 10%
C151	2113945A10	CAP CER CHP 1500PF 50V 10%
C152	2113945A10	CAP CER CHP 1500PF 50V 10%
C153	2113946L04	CAP CER CHP 0.47UF 16V
C154	2113945A10	CAP CER CHP 1500PF 50V 10%
C155	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C156	2113945B02	CAP CER CHP 10,000PF 25V 10%
C157	2113946K02	CAP CER CHP 0.10UF 16V
C158	2113945A10	CAP CER CHP 1500PF 50V 10%
C159	2113945A10	CAP CER CHP 1500PF 50V 10%
C170	2113946K02	CAP CER CHP 0.10UF 16V
C171	2113944A11	CAP CER CHP 2.7PF 50V +/- 0.25PF
C172	2113945A10	CAP CER CHP 1500PF 50V 10%
C201	2113944C02	CAP CER CHP 220.0PF 50V 5%
C202	2115153H52	CAP, CERAMIC, COG
C203	2115153H13	CAP, CERAMIC, COG
C204	2113945A05	CAP CER CHP 470PF 50V 10%
C205	NOT PLACED	64AM DUMMY PART NUMBER
C206	NOT PLACED	64AM DUMMY PART NUMBER
C207	2113945A05	CAP CER CHP 470PF 50V 10%
C208	2113945A05	CAP CER CHP 470PF 50V 10%
C209	2113945A05	CAP CER CHP 470PF 50V 10%
C210	2113945A05	CAP CER CHP 470PF 50V 10%
C211	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C212	2113946N03	CAP CER CHP 2.2UF 16V
C213	2113945B02	CAP CER CHP 10,000PF 25V 10%
C214	2113945A09	CAP CER CHP 1000PF 50V 10%
C215	2113946N03	CAP CER CHP 2.2UF 16V

Circuit Ref	Motorola Part No.	Description
C216	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C217	2113945A09	CAP CER CHP 1000PF 50V 10%
C218	2113946N03	CAP CER CHP 2.2UF 16V
C219	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C220	2113944A29	CAP CER CHP 22.0PF 50V 5%
C221	2113945B02	CAP CER CHP 10,000PF 25V 10%
C222	2113945B02	CAP CER CHP 10,000PF 25V 10%
C223	2113945B02	CAP CER CHP 10,000PF 25V 10%
C224	2113945B02	CAP CER CHP 10,000PF 25V 10%
C225	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C226	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C227	2113945A09	CAP CER CHP 1000PF 50V 10%
C228	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C230	2113946N03	CAP CER CHP 2.2UF 16V
C231	2113945A09	CAP CER CHP 1000PF 50V 10%
C232	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C233	2313960B30	CAP,FXD,4.7UF,+10%,-10%, 10V-DC,SM,-55DEG CMIN,125DEG CMAX,122MA
C241	2113945A60	CAP,FXD,1200PF,+10%, -10%, 50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C243	2113945G91	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0805,X7R,-55DEG CMIN,125DEG CMAX
C244	2113945L27	CAP,FXD,1200PF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C245	2313960C26	CAP,FXD,1UF,+10%,-10%, 35V-DC,SM,-55DEG CMIN, 125DEG CMAX,114MA,E
C251	2113945L49	CAP,FXD,.01UF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX,P
C253	2115153H38	CAP, CERAMIC, COG
C254	2115153H15	CAP, CERAMIC, COG
C255	2115153H39	CAP, CERAMIC, COG
C256	2115153H27	CAP, CERAMIC, COG
C257	2115153H46	CAP, CERAMIC, COG
C258	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C263	2115153H43	CAP, CERAMIC, COG
C264	2115153H19	CAP, CERAMIC, COG
C265	2115153H37	CAP, CERAMIC, COG
C266	2115153H27	CAP, CERAMIC, COG
C267	2115153H46	CAP, CERAMIC, COG
C268	2115153H13	CAP, CERAMIC, COG
C269	2113945A10	CAP CER CHP 1500PF 50V 10%
C270	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C271	2113945B02	CAP CER CHP 10,000PF 25V 10%
C272	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C273	2113945B02	CAP CER CHP 10,000PF 25V 10%
C274	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C275	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C276	2113944A18	CAP CER CHP 5.1PF 50V +/- 0.5PF
C277	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C281	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C282	2113944A24	CAP CER CHP 9.1PF 50V +/- 0.5PF
C283	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C284	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C285	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C286	2113944A77	CAP,FXD,11PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C290	2113944A85	CAP,FXD,51PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C291	2113944A83	CAP,FXD,36PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C292	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C293	2113945A05	CAP CER CHP 470PF 50V 10%
C301	2113945A04	CAP CER CHP 390PF 50V 10%
C302	2113945A04	CAP CER CHP 390PF 50V 10%
C303	2313960F04	CAP,FXD,33UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,303MA
C304	2113945B02	CAP CER CHP 10,000PF 25V 10%
C305	2113944A40	CAP CER CHP 100.0PF 50V 5%
C306	2113945L49	CAP,FXD,.01UF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX,P
C310	2113945B02	CAP CER CHP 10,000PF 25V 10%
C311	2113945C21	CAP,FXD,.018UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMA
C312	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C313	2113945B02	CAP CER CHP 10,000PF 25V 10%
C314	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C315	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C316	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C320	2113945C21	CAP,FXD,.018UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMA
C321	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN,125DEG CMAX,174MA
C322	2113945B02	CAP CER CHP 10,000PF 25V 10%
C323	2113944A42	CAP CER CHP 150.0PF 50V 5%
C331	2113945B02	CAP CER CHP 10,000PF 25V 10%
C333	2113945B02	CAP CER CHP 10,000PF 25V 10%
C334	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C400	NOT PLACED	64AM DUMMY PART NUMBER
C401	2113946K02	CAP CER CHP 0.10UF 16V
C402	2113945A09	CAP CER CHP 1000PF 50V 10%
C403	2113944A40	CAP CER CHP 100.0PF 50V 5%
C404	2113945A09	CAP CER CHP 1000PF 50V 10%
C405	2113944A40	CAP CER CHP 100.0PF 50V 5%
C406	2113944A40	CAP CER CHP 100.0PF 50V 5%
C407	2113945A09	CAP CER CHP 1000PF 50V 10%
C408	2113945A09	CAP CER CHP 1000PF 50V 10%
C409	2113945A09	CAP CER CHP 1000PF 50V 10%
C410	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C411	2113946K02	CAP CER CHP 0.10UF 16V
C412	2113945A09	CAP CER CHP 1000PF 50V 10%
C413	2113946K02	CAP CER CHP 0.10UF 16V
C414	2113946K02	CAP CER CHP 0.10UF 16V
C415	2113945A09	CAP CER CHP 1000PF 50V 10%
C416	2113945A09	CAP CER CHP 1000PF 50V 10%
C417	2113945A09	CAP CER CHP 1000PF 50V 10%
C418	2113946K02	CAP CER CHP 0.10UF 16V

Circuit Ref	Motorola Part No.	Description
C419	2113945A09	CAP CER CHP 1000PF 50V 10%
C420	2113945B02	CAP CER CHP 10,000PF 25V 10%
C421	2113945B02	CAP CER CHP 10,000PF 25V 10%
C422	2113945B02	CAP CER CHP 10,000PF 25V 10%
C425	2113946E02	CAP CER CHP 1.0UF 16V 10%
C426	2313960B01	CAP,FXD,1UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,87MA,E
C430	2113946K02	CAP CER CHP 0.10UF 16V
C431	2113945A09	CAP CER CHP 1000PF 50V 10%
C432	2113946K02	CAP CER CHP 0.10UF 16V
C433	2113945A09	CAP CER CHP 1000PF 50V 10%
C440	2113945B02	CAP CER CHP 10,000PF 25V 10%
C441	2113945B02	CAP CER CHP 10,000PF 25V 10%
C442	2113945B02	CAP CER CHP 10,000PF 25V 10%
C443	2113945B02	CAP CER CHP 10,000PF 25V 10%
C444	2113945B02	CAP CER CHP 10,000PF 25V 10%
C445	2113945B02	CAP CER CHP 10,000PF 25V 10%
C446	2113945B02	CAP CER CHP 10,000PF 25V 10%
C447	2113946K02	CAP CER CHP 0.10UF 16V
C451	2113946K02	CAP CER CHP 0.10UF 16V
C452	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C453	2313960B30	CAP,FXD,4.7UF,+10%,-10%, 10V-DC,SM,-55DEG CMIN, 125DEG CMAX,122MA
C454	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C455	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C456	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C457	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C458	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C459	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C460	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C461	2113946F03	CAP CER CHP 4.7UF 6.3V 10%
C462	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C463	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C464	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C465	2113945A09	CAP CER CHP 1000PF 50V 10%
C466	NOT PLACED	64AM DUMMY PART NUMBER
C467	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C470	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C471	2113946N03	CAP CER CHP 2.2UF 16V
C472	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C473	2113944A42	CAP CER CHP 150.0PF 50V 5%
C474	2113944A42	CAP CER CHP 150.0PF 50V 5%
C475	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C476	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C477	2113946K02	CAP CER CHP 0.10UF 16V
C478	2113944A42	CAP CER CHP 150.0PF 50V 5%
C479	2113944A42	CAP CER CHP 150.0PF 50V 5%
C480	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C481	NOT PLACED	64AM DUMMY PART NUMBER
C482	NOT PLACED	64AM DUMMY PART NUMBER
C483	2113946C02	CAP CER CHP 0.22UF 10V 10%
C484	NOT PLACED	64AM DUMMY PART NUMBER
C488	2113945A05	CAP CER CHP 470PF 50V 10%
C489	2113945A05	CAP CER CHP 470PF 50V 10%
C490	2113945A05	CAP CER CHP 470PF 50V 10%
C492	2113955E37	CAP,FXD,10UF,+10%,-10%, 16V-DC,1210,X7R,-55DEG CMIN,125DEG CMAX
C493	2113945A09	CAP CER CHP 1000PF 50V 10%
C494	2113946N03	CAP CER CHP 2.2UF 16V
C495	2113946N02	CAP CER CHP 1.0UF 16V
C496	2113946N02	CAP CER CHP 1.0UF 16V
C497	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C498	2113946N02	CAP CER CHP 1.0UF 16V
C499	2113944A32	CAP CER CHP 39.0PF 50V 5%
C500	2113945A09	CAP CER CHP 1000PF 50V 10%
C501	2113946N02	CAP CER CHP 1.0UF 16V
C503	2113945A09	CAP CER CHP 1000PF 50V 10%
C504	2113945A09	CAP CER CHP 1000PF 50V 10%
C505	2113945A09	CAP CER CHP 1000PF 50V 10%
C506	2113945A09	CAP CER CHP 1000PF 50V 10%
C507	2113945A09	CAP CER CHP 1000PF 50V 10%
C511	2113944C02	CAP CER CHP 220.0PF 50V 5%
C512	2113944A21	CAP CER CHP 6.8PF 50V +/- 0.5PF
C513	2113944C02	CAP CER CHP 220.0PF 50V 5%
C514	2113944A79	CAP,FXD,16PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C518	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C519	2113946N02	CAP CER CHP 1.0UF 16V
CR1	4813974A19	DIODE ARRAY,MXR,SM, SOT-323,7V,.2W,SHTK,2, PB-FREE
CR41	4815923H01	SCHOTTKY DIODE-NEW LEADFREE
CR51	4813974A19	DIODE ARRAY,MXR,SM, SOT-323,7V,.2W,SHTK,2, PB-FREE
D51	4815047H01	BAND SWITCHIND DIODE,ROHM DAN
D52	4815047H01	BAND SWITCHIND DIODE,ROHM DAN
D120	4880973Z02	PIN DIODE
D121	4880973Z02	PIN DIODE
D201	4815072H01	DIODE VARACTOR
D220	4815011H01	DIODE TRIPLE
D221	4815011H01	DIODE TRIPLE
D251	4885094Y01	DIODE VARACTOR ISV228 W18
D261	4885094Y01	DIODE VARACTOR ISV228 W18
D262	4885055Y01	DIODE VARACTOR PB-FREE
D301	4815713H01	DIODE SCHOTTKY 1A 20V PWRMITE
D414	4816064H01	SOT SMBD1022 RH29M19 LH PB-FREE
D424	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D425	4816064H01	SOT SMBD1022 RH29M19 LH PB-FREE
D440	4805729G49	DIODE RED/YEL
D470	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D471	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D491	NOT PLACED	64AM DUMMY PART NUMBER

Circuit Ref	Motorola Part No.	Description
E451	2480640Z01	SURFACE MOUNT FERRITE BEAD
E452	2480640Z01	SURFACE MOUNT FERRITE BEAD
E453	2480640Z01	SURFACE MOUNT FERRITE BEAD
E500	2480640Z01	SURFACE MOUNT FERRITE BEAD
F301	6515076H01	FUSE CHIP SMT TR/1608FF 3A
FL51	9180022M11	XTAL FILTER 44.85MHZ
FL52	9180468V04	SMD455KHZ 4 ELEMENT CER FLTR
FL53	9115811H03	SMD455KHZ 6 ELEMENT
FL54	9115811H01	SMD455KHZ 6 ELEMENT
J140	0986428Z02	CONNECTOR, RF
J301	0986565Z02	CONNECTOR CONTACT BATTERY
J460	0986615Z02	CONN,ZIF,F,28CONT,,TIN,,,CBL
J470	0985818A02	CONNECTOR, MICROPHONE, 2-PIN
J471	0980683Z03	AUDIO JACK (MONO & STEREO)
J491	2815162H01	HEADER SMT HORZ MOUNT LEAD-FREE
L1	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L2	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L3	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L4	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L21	NOT PLACED	64AM DUMMY PART NUMBER
L22	2414017N24	IDCTR,CHIP,100NH,5%,300MA,2OHM,CER,14 Q, 700MHZ SRF,SM,0603,P
L31	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L32	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L33	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L40	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L41	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L51	2414017N26	IDCTR,CHIP,150NH,5%,200MA,2.4OHM,CER,11 Q, 550MHZ SRF,SM,0603
L52	2414032F44	IDCTR,WW,680NH,10%,130MA,4OHM,CER,30 Q, 570MHZ SRF,SM,LEAD-F
L53	2113944A41	CAP CER CHP 120.0PF 50V 5%
L54	2414015A25	IDCTR,FXD,1.2UH,2%,440MA,2OHM,CER,20 Q,200MHZ SRF,SM,1008,PB
L81	2414015A19	IDCTR,FXD,1UH,2%,460MA, 1.75OHM,CER,33 Q,290MHZ SRF,SM,1008,P
L100	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L101	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L102	2415429H36	CHIP INDUCTOR
L103	2415429H25	CHIP INDUCTOR
L110	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L120	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L121	2414032B49	IDCTR,WW,47NH,5%,1A,.16OHM,CER,50 Q,1.35GHZ SRF,SM,PB-FREE
L130	2479990N01	INDUCTOR,AIR WOUND, 43.67NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND (GREEN COLOUR)
L131	2479990N01	INDUCTOR,AIR WOUND, 43.67NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND (GREEN COLOUR)
L132	2479990N01	INDUCTOR,AIR WOUND, 43.67NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND (GREEN COLOUR)
L140	2479990M01	INDUCTOR,AIR WOUND, 30.54NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND (GREEN COLOUR)
L211	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L251	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L252	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L253	2415429H36	CHIP INDUCTOR
L254	2414015C05	IDCTR,FXD,33NH,2%,1.3MA, .09OHM,CER,75 Q,1.7GHZ SRF,SM,1008,P
L255	2414017K29	IDCTR,CHIP,330NH,5%,150MA,1.5OHM,CER,11 Q, 250MHZ SRF,SM,0805
L262	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L263	2415429H36	CHIP INDUCTOR
L264	2414015C07	IDCTR,FXD,47NH,2%,1.2MA, .12OHM,CER,75 Q,1.45GHZ SRF,SM,1008
L265	2414017K29	IDCTR,CHIP,330NH,5%,150MA,1.5OHM,CER,11 Q, 250MHZ SRF,SM,0805
L270	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L271	NOT PLACED	64AM DUMMY PART NUMBER
L276	2414017N24	IDCTR,CHIP,100NH,5%,300MA,2OHM,CER,14 Q, 700MHZ SRF,SM,0603,P
L281	2414017N22	IDCTR,CHIP,68NH,5%,400MA,1.2OHM,CER,14 Q, 800MHZ SRF,SM,0603
L282	2414017N20	IDCTR,CHIP,47NH,5%,500MA,.86OHM,CER,14 Q, 900MHZ SRF,SM,0603
L283	NOT PLACED	64AM DUMMY PART NUMBER
L291	2414017N17	IDCTR,CHIP,27NH,5%,600MA,.62OHM,CER,12 Q,1.2GHZ SRF,SM,0603
L292	2414017N22	IDCTR,CHIP,68NH,5%,400MA,1.2OHM,CER,14 Q, 800MHZ SRF,SM,0603
L471	2414017K30	IDCTR,CHIP,390NH,5%,150MA,1.8OHM,CER,11Q,200MHZSRF,SM,0805,P
M140	0286427Z02	NUT, ANTENNA
PASTE	1085674C03	PASTE/NC-SMQ230
Q21	4802245J95	BJT, NPN TRANSISTOR
Q22	4815267H01	DBRT UMT1NFTN
Q51	4802197J95	RF TRANSISTOR PBR941
Q70	4813973M07	XSTR,BIP GP SS, NPN, T3904,SM, SOT-23,SMT, 40V,.225W, 200MA, 300MHZ
Q100	4802245J95	BJT, NPN TRANSISTOR
Q150	4813973M07	XSTR,BIP GP SS,NPN, T3904,SM,SOT-23,SMT, 40V,.225W,200MA,300MHZ
Q170	4809939C34	TSTR DUAL PNP EMB10T2R EMT6
Q171	4813973M07	XSTR,BIP GP SS, NPN, T3904,SM, SOT-23, SMT, 40V,.225W,200MA, 300MHZ
Q280	4802245J95	BJT, NPN TRANSISTOR
Q311	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q312	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q313	4815066H01	UMG5N DIGITAL TRANSISTOR
Q402	4813973A42	XSTR,BIP GP SS,NPN,SM, SC-59,SMT,50V,.23W,100MA, PB-FREE
Q403	4813973A13	XSTR,GEN PURPOSE SMALL SIG,PNP, MMBT3906L,TO-236,4, PB-FREE
Q410	4815066H01	UMG5N DIGITAL TRANSISTOR
Q425	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q426	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q427	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q440	4815154H01	DUAL TRANS NPN

Circuit Ref	Motorola Part No.	Description
Q470	4815267H01	DBRT UMT1NFTN
Q471	4815066H01	UMG5N DIGITAL TRANSISTOR
Q472	4815267H01	DBRT UMT1NFTN
Q481	NOT PLACED	64AM DUMMY PART NUMBER
Q482	NOT PLACED	64AM DUMMY PART NUMBER
Q490	4815066H01	UMG5N DIGITAL TRANSISTOR
Q493	4.89E+31	TSTR MOSFET P-CHAN TP0101T
Q494	4815066H01	UMG5N DIGITAL TRANSISTOR
Q520	4815154H01	DUAL TRANS NPN
R20	0613952Z52	RES,MF,6.8KOHM,1%,.0625 W,SM,0402,200PPM/CEL, PB-FREE
R21	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R22	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R23	0613952Z58	RES,MF,22KOHM,1%,.0625 W, SM,0402,200PPM/CEL, PB-FREE
R24	0613952Q70	CER CHIP RES 750 OHM 5% 0402
R25	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R26	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R40	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R51	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R52	0613952R03	CER CHIP RES 12K OHM 5% 0402
R53	0613952R13	CER CHIP RES 33K OHM 5% 0402
R54	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R55	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R57	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R60	0613952Q82	CER CHIP RES 2400 OHM 5% 0402
R61	0613952R25	CER CHIP RES 100K OHM 5% 0402
R62	0613952Q85	CER CHIP RES 3300 OHM 5% 0402
R63	0613952R15	CER CHIP RES 39K OHM 5% 0402
R64	0613952R08	CER CHIP RES 20K OHM 5% 0402
R65	0613952R15	CER CHIP RES 39K OHM 5% 0402
R66	0613952R08	CER CHIP RES 20K OHM 5% 0402
R67	0613952R08	CER CHIP RES 20K OHM 5% 0402
R72	0613952Q63	CER CHIP RES 390 OHM 5% 0402
R73	0613952Q79	CER CHIP RES 1800 OHM 5% 0402
R74	0613952Q75	CER CHIP RES 1200 OHM 5% 0402
R75	0613952R03	CER CHIP RES 12K OHM 5% 0402
R76	0613952Z55	RES,MF,12KOHM,1%,.0625 W, SM,0402,200PPM/CEL, PB-FREE
R77	0613952Z53	RES,MF,8.2KOHM,1%,.0625 W, SM,0402,200PPM/CEL, PB-FREE
R78	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R80	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R81	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R82	NOT PLACED	64AM DUMMY PART NUMBER
R90	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R91	0613952Q78	CER CHIP RES 1600 OHM 5% 0402
R100	0613952Q60	CER CHIP RES 300 OHM 5% 0402
R101	0613952Q31	CER CHIP RES 18.0 OHM 5% 0402
R102	0613952Q60	CER CHIP RES 300 OHM 5% 0402
R103	0613952Q85	CER CHIP RES 3300 OHM 5% 0402
R104	0613952H42	CER CHIP RES 51.0 OHM 5% 0603
R105	0613952Q75	CER CHIP RES 1200 OHM 5% 0402
R106	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R107	0613952Q53	CER CHIP RES 150 OHM 5% 0402
R110	0613952Q62	CER CHIP RES 360 OHM 5% 0402
R111	0613952R01	CER CHIP RES 10K OHM 5% 0402
R120	0613958H53	CER CHIP RES 150 OHM 5% 0805
R121	0613958H53	CER CHIP RES 150 OHM 5% 0805
R150	0615043C01	RES POWER METAL STRIP W18 COMPLIANT
R151	0613952H33	CER CHIP RES 22.0 OHM 5% 0603
R152	0613952P01	CER CHIP RES 100K OHM 1% 0402
R153	0613952P01	CER CHIP RES 100K OHM 1% 0402
R154	0613952P01	CER CHIP RES 100K OHM 1% 0402
R155	0613952P01	CER CHIP RES 100K OHM 1% 0402
R156	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R157	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R158	0613952Q77	CER CHIP RES 1500 OHM 5% 0402
R162	0613952R01	CER CHIP RES 10K OHM 5% 0402
R171	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R202	0613952R29	CER CHIP RES 150K OHM 5% 0402
R205	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R206	NOT PLACED	64AM DUMMY PART NUMBER
R212	0613958J74	CER CHIP RES 0.0 OHM JMP 0805
R220	0613952Q53	CER CHIP RES 150 OHM 5% 0402
R221	0613952Q53	CER CHIP RES 150 OHM 5% 0402
R223	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R227	0613952R29	CER CHIP RES 150K OHM 5% 0402
R230	0613952R26	CER CHIP RES 110K OHM 5% 0402
R243	0613952Q79	CER CHIP RES 1800 OHM 5% 0402
R244	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R245	0613952Q77	CER CHIP RES 1500 OHM 5% 0402
R246	0613952R25	CER CHIP RES 100K OHM 5% 0402
R247	0613952R30	CER CHIP RES 160K OHM 5% 0402
R248	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R253	0613952Q41	CER CHIP RES 47.0 OHM 5% 0402
R254	0613952Q57	CER CHIP RES 220 OHM 5% 0402
R255	0613952Z46	RES,MF,3.9KOHM,1%, .0625W,SM,0402, 200PPM/CEL, PB-FREE
R261	0613952R18	CER CHIP RES 51K OHM 5% 0402
R262	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R263	0613952Q36	CER CHIP RES 30.0 OHM 5% 0402
R264	0613952Q57	CER CHIP RES 220 OHM 5% 0402
R270	0613952Q31	CER CHIP RES 18.0 OHM 5% 0402
R271	0613952Q95	CER CHIP RES 8200 OHM 5% 0402
R272	0613952Q96	CER CHIP RES 9100 OHM 5% 0402
R273	0613952Q60	CER CHIP RES 300 OHM 5% 0402
R274	0613952Q37	CER CHIP RES 33.0 OHM 5% 0402
R275	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R276	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R280	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R281	0613952Q96	CER CHIP RES 9100 OHM 5% 0402
R282	0613952Q70	CER CHIP RES 750 OHM 5% 0402
R283	0613952Q55	CER CHIP RES 180 OHM 5% 0402
R284	0613952Q61	CER CHIP RES 330 OHM 5% 0402

Circuit Ref	Motorola Part No.	Description
R286	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R310	0613952R25	CER CHIP RES 100K OHM 5% 0402
R311	0613952R25	CER CHIP RES 100K OHM 5% 0402
R312	0613952R08	CER CHIP RES 20K OHM 5% 0402
R313	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R320	0613952Z80	RES,MF,330KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R321	0613952P30	CER CHIP RES 200K OHM 1% 0402
R322	0613952R25	CER CHIP RES 100K OHM 5% 0402
R400	NOT PLACED	64AM DUMMY PART NUMBER
R401	0613952R36	CER CHIP RES 300K OHM 5% 0402
R402	0613952R01	CER CHIP RES 10K OHM 5% 0402
R403	0613952R01	CER CHIP RES 10K OHM 5% 0402
R404	0613952R18	CER CHIP RES 51K OHM 5% 0402
R405	0613952R36	CER CHIP RES 300K OHM 5% 0402
R406	0613952R33	CER CHIP RES 220K OHM 5% 0402
R407	0613952R25	CER CHIP RES 100K OHM 5% 0402
R408	0613952R25	CER CHIP RES 100K OHM 5% 0402
R409	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R410	0613952R01	CER CHIP RES 10K OHM 5% 0402
R411	0613952Q71	CER CHIP RES 820 OHM 5% 0402
R412	0613952R25	CER CHIP RES 100K OHM 5% 0402
R413	0613952R25	CER CHIP RES 100K OHM 5% 0402
R414	0613952R13	CER CHIP RES 33K OHM 5% 0402
R415	0613952R13	CER CHIP RES 33K OHM 5% 0402
R416	0613952R08	CER CHIP RES 20K OHM 5% 0402
R417	0613952R01	CER CHIP RES 10K OHM 5% 0402
R418	0613952R25	CER CHIP RES 100K OHM 5% 0402
R419	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R420	0613952P30	CER CHIP RES 200K OHM 1% 0402
R421	0613952P01	CER CHIP RES 100K OHM 1% 0402
R422	0613952R25	CER CHIP RES 100K OHM 5% 0402
R423	0613952R25	CER CHIP RES 100K OHM 5% 0402
R424	0613952P30	CER CHIP RES 200K OHM 1% 0402
R425	0613952P01	CER CHIP RES 100K OHM 1% 0402
R430	0613952R25	CER CHIP RES 100K OHM 5% 0402
R431	NOT PLACED	64AM DUMMY PART NUMBER
R432	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R433	0613952R25	CER CHIP RES 100K OHM 5% 0402
R434	NOT PLACED	64AM DUMMY PART NUMBER
R440	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R441	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R442	0613952H57	CER CHIP RES 220 OHM 5% 0603
R443	0613952H51	CER CHIP RES 120 OHM 5% 0603
R445	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R446	0613952R01	CER CHIP RES 10K OHM 5% 0402
R451	0613952R17	CER CHIP RES 47K OHM 5% 0402
R460	0613952R10	CER CHIP RES 24K OHM 5% 0402
R462	0613952R10	CER CHIP RES 24K OHM 5% 0402
R463	0613952R10	CER CHIP RES 24K OHM 5% 0402
R464	0613952R12	CER CHIP RES 30K OHM 5% 0402
R469	0613952Q25	CER CHIP RES 10.0 OHM 5% 0402
R470	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R471	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R472	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R473	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R474	0613952H61	CER CHIP RES 330 OHM 5% 0603
R475	0613952R31	CER CHIP RES 180K OHM 5% 0402
R476	0613952R25	CER CHIP RES 100K OHM 5% 0402
R477	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R478	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R479	0613952R25	CER CHIP RES 100K OHM 5% 0402
R480	0613952G67	CER CHIP RES 0.0 +/-0.050 OHM
R481	NOT PLACED	64AM DUMMY PART NUMBER
R482	NOT PLACED	64AM DUMMY PART NUMBER
R483	NOT PLACED	64AM DUMMY PART NUMBER
R484	NOT PLACED	64AM DUMMY PART NUMBER
R485	NOT PLACED	64AM DUMMY PART NUMBER
R486	NOT PLACED	64AM DUMMY PART NUMBER
R487	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R488	0613952R37	CER CHIP RES 330K OHM 5% 0402
R489	NOT PLACED	64AM DUMMY PART NUMBER
R490	NOT PLACED	64AM DUMMY PART NUMBER
R491	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R492	0613952R10	CER CHIP RES 24K OHM 5% 0402
R493	0613952R37	CER CHIP RES 330K OHM 5% 0402
R494	0613952Z80	RES,MF,330KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R495	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R496	NOT PLACED	64AM DUMMY PART NUMBER
R497	NOT PLACED	64AM DUMMY PART NUMBER
R498	NOT PLACED	64AM DUMMY PART NUMBER
R499	NOT PLACED	64AM DUMMY PART NUMBER
R501	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R502	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R503	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R504	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R505	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R506	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R507	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R508	0613952R25	CER CHIP RES 100K OHM 5% 0402
R509	0613952R25	CER CHIP RES 100K OHM 5% 0402
R510	0613952R37	CER CHIP RES 330K OHM 5% 0402
R511	0613952R25	CER CHIP RES 100K OHM 5% 0402
R512	0613952R29	CER CHIP RES 150K OHM 5% 0402
R513	NOT PLACED	64AM DUMMY PART NUMBER
R514	0613952R25	CER CHIP RES 100K OHM 5% 0402
R515	NOT PLACED	64AM DUMMY PART NUMBER
R516	NOT PLACED	64AM DUMMY PART NUMBER
R517	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R518	0613952R33	CER CHIP RES 220K OHM 5% 0402
R519	0613952R25	CER CHIP RES 100K OHM 5% 0402

Circuit Ref	Motorola Part No.	Description
R520	0613952R25	CER CHIP RES 100K OHM 5% 0402
R521	NOT PLACED	64AM DUMMY PART NUMBER
R522	0613952R25	CER CHIP RES 100K OHM 5% 0402
R523	0613952R01	CER CHIP RES 10K OHM 5% 0402
R524	0613952R01	CER CHIP RES 10K OHM 5% 0402
R525	0613952R01	CER CHIP RES 10K OHM 5% 0402
R526	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
S440	4080710Z26	SWITCH, FREQUENCY (EPP)
S441	4070354A01	LIGHT TOUCH SWITCH-SMD
S442	4070354A01	LIGHT TOUCH SWITCH-SMD
S443	4070354A01	LIGHT TOUCH SWITCH-SMD
S444	1880619Z06	POTENTIOMETER, VOLUME
SH1	2686421Z02	SHIELD, FE, ELP
SH40	2686419Z02	SHIELD, MIXER, ELP
SH50	2686423Z02	SHIELD, 19 X 19 X 3.03 MM
SH52	2686424Z02	SHIELD, IF, ELP
SH100	2686418Z03	SHEILD, HARMONIC FILTER, ELP
SH200	2686424Z02	SHIELD, IF, ELP
SH201	2686423Z02	SHIELD, 19 X 19 X 3.03 MM
SH250	2686425Z02	SHIELD
SH251	2686425Z02	SHIELD
SH253	2686422Z02	SHIELD, BUFFER, ELP
SH400	2686420Z04	SHIELD, CONTROL, ELP
SH401	2686420Z03	SHIELD, CONTROL, ELP
SP7	1088791Y02	SOLDER PELLETS, LEAD FREE
T41	2515121H01	BALUN, TRANSFORMER W18 COMP
T42	2515121H01	BALUN, TRANSFORMER W18 COMP
U51	5115281H01	FM IF IC SA616 FROM PHILIPS
U52	5115070H01	IC 3-INV LMOS TC7W04FU
U110	0186438Z04	ASSY,AMP
U150	5114005A01	IC,OP AMP,2PER PKG,GP, SM,SO-8,PB-FREE
U151	2415954H02	INDUCTOR BEAD CHIP EPP WITH EPOXY

Circuit Ref	Motorola Part No.	Description
U201	5185177Y01	IC TESTED AT25016 48 PIN W18
U251	5171121L01	CUSTOM LOW VOLTAGE VCO BUFFER IC
U310	5115746H01	VOLTAGE REGULATOR, 5V
U320	5115679H01	IC VOLTAGE REGLTR LP2986
U330	5115745H01	VOLTAGE REGULATOR, 3V
U401	5185143E03	HC11FL0 (3V) ASIC MICRO-P
U402	5116648H01	128KBIT SERIAL SPI BUS EEPROM
U403	NOT PLACED	64AM DUMMY PART NUMBER
U404	51012084002	IC FLASH 4MBIT 3.3V 8MM14MM
U425	5115697H01	LOW PWR OP AMP W/RAIL TO RAIL
U451	5115062H01	IC ASFIC_CMP
U480	NOT PLACED	64AM DUMMY PART NUMBER
U490	5116029H01	1 W BTL AUDIO AMPLIFIER
U510	5114005A01	IC,OP AMP,2PER PKG,GP, SM,SO-8,PB-FREE
U511	4815066H01	UMG5N DIGITAL TRANSISTOR
VR110	4813977A55	DIODE,ZEN,MM3Z4V3,SM, SOD-323,4.3V,10MA,.2W, ZEN,PB-FREE
VR301	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR302	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR471	4813977M14	DIODE,ZEN,MBZ5235,SM, SOT-23,6.8V,10MA,.225W, ZEN,PB-FREE
VR472	4813977M05	DIODE,ZEN,MBZ5226,SM, SOT-23,3.3V,10MA,.225W, ZEN,PB-FREE
VR473	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR474	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR475	4813977M24	DIODE,ZEN,MBZ5245,SM, SOT-23,15V,10MA,.225W, ZEN,PB-FREE
Y51	4802245J84	XTAL 44.395MHZ, 3RD OT, SMD
Y70	9186145B02	CER.DISCR. CDBCA455CX36-TC

Circuit Ref	Motorola Part No.	Description
Y201	4880114R08	CRYSTAL, QUARTZ 16.8 MHZ
Y202	NOT PLACED	64AM DUMMY PART NUMBER

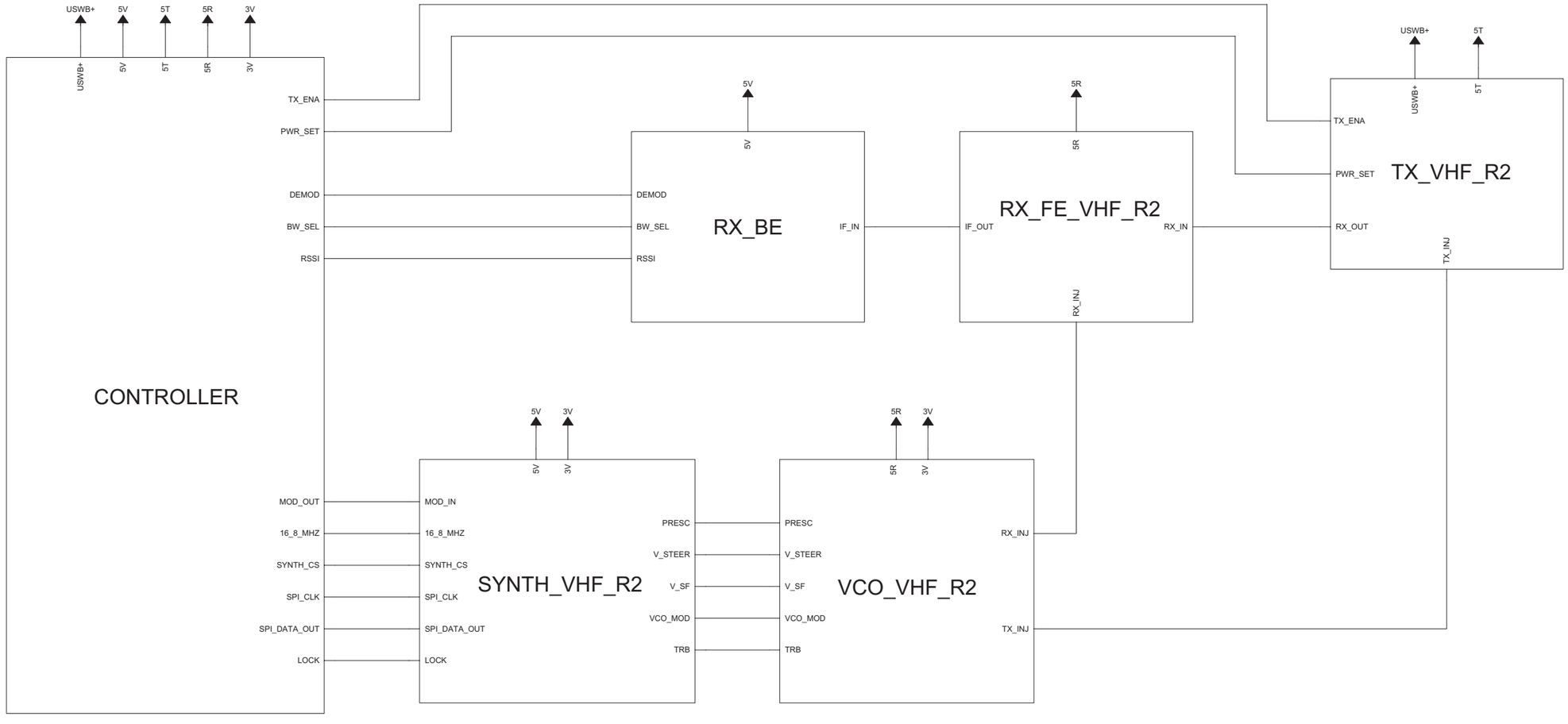


Figure 7-97. VHF (146–174 MHz) Radio Circuit Block Interconnect Diagram (8486769Z08-G)

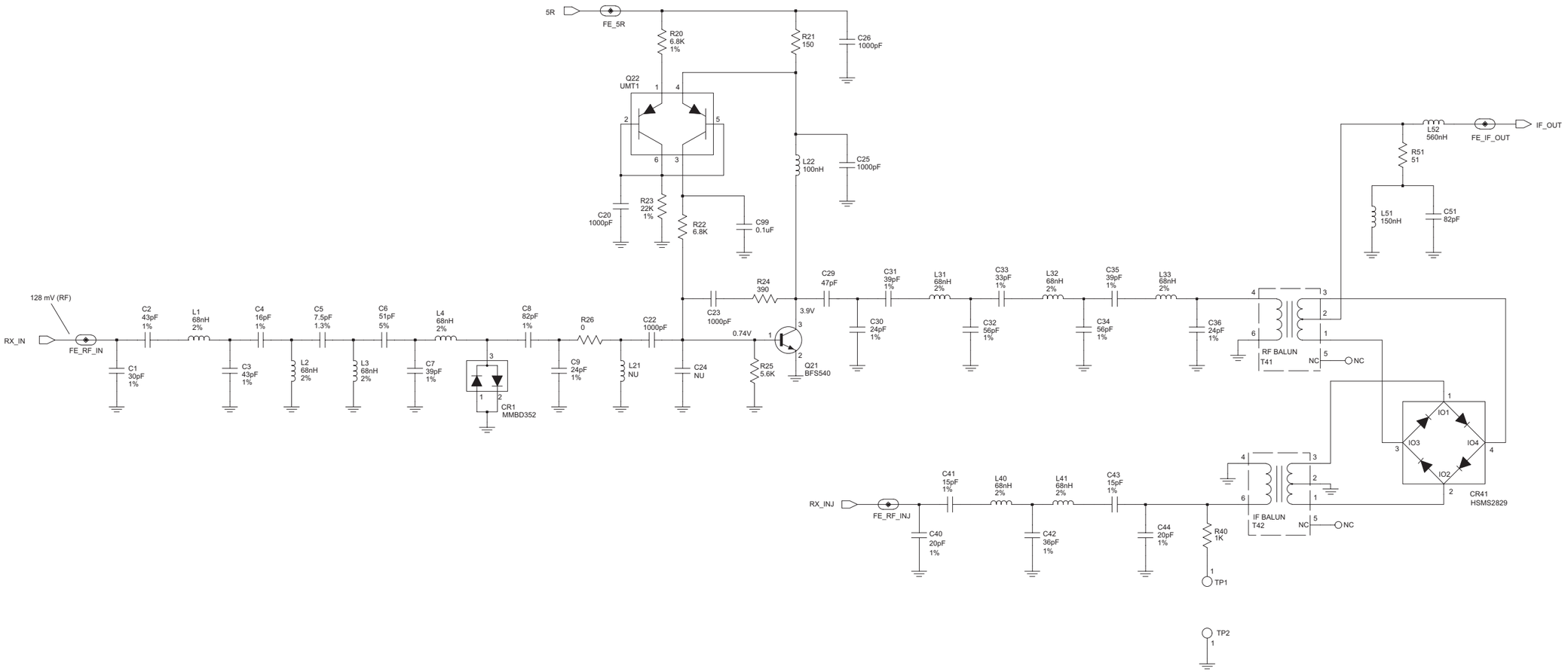


Figure 7-98. VHF (146–174 MHz) Receiver Front End Schematic Diagram (8486769Z08-G)

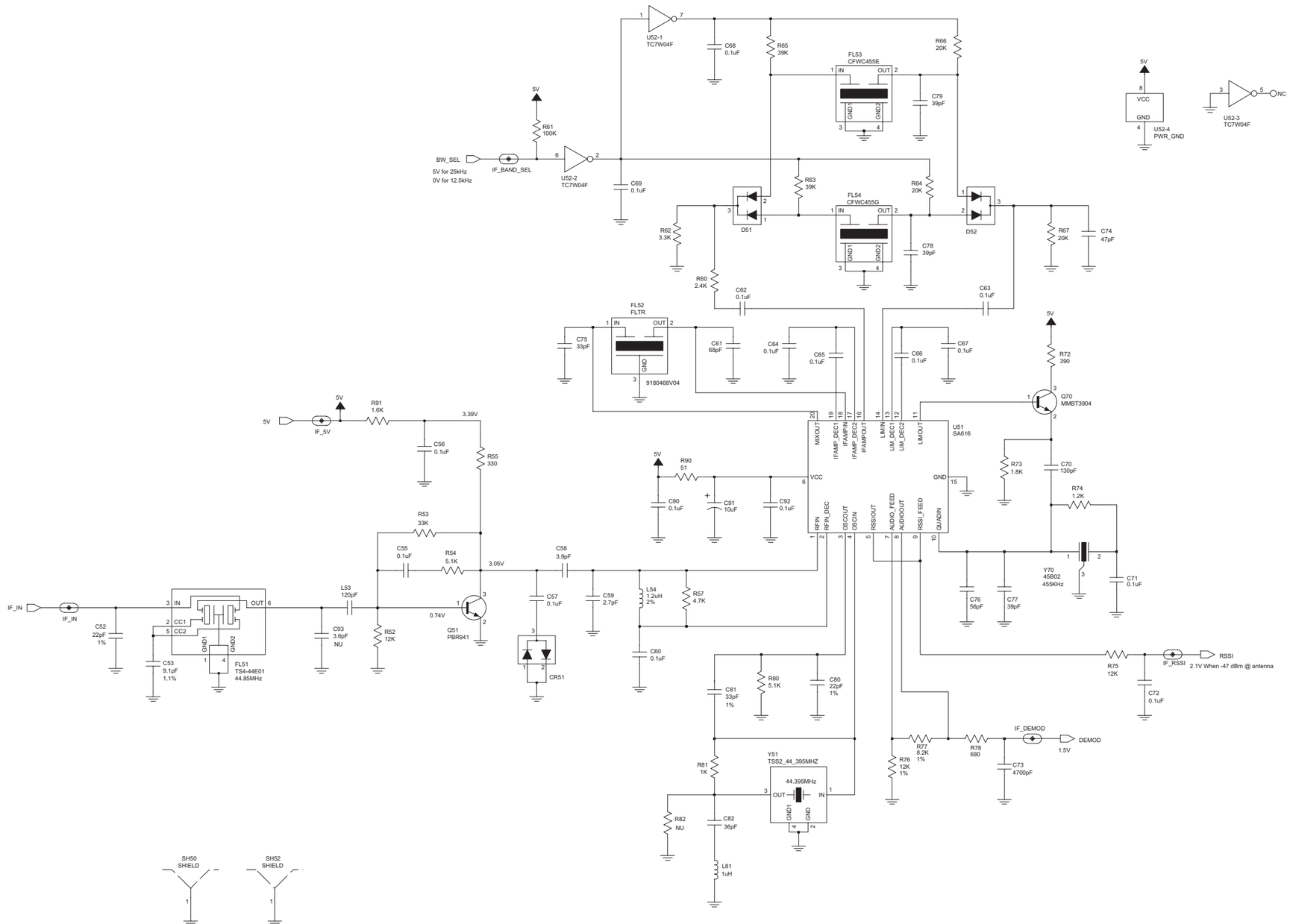
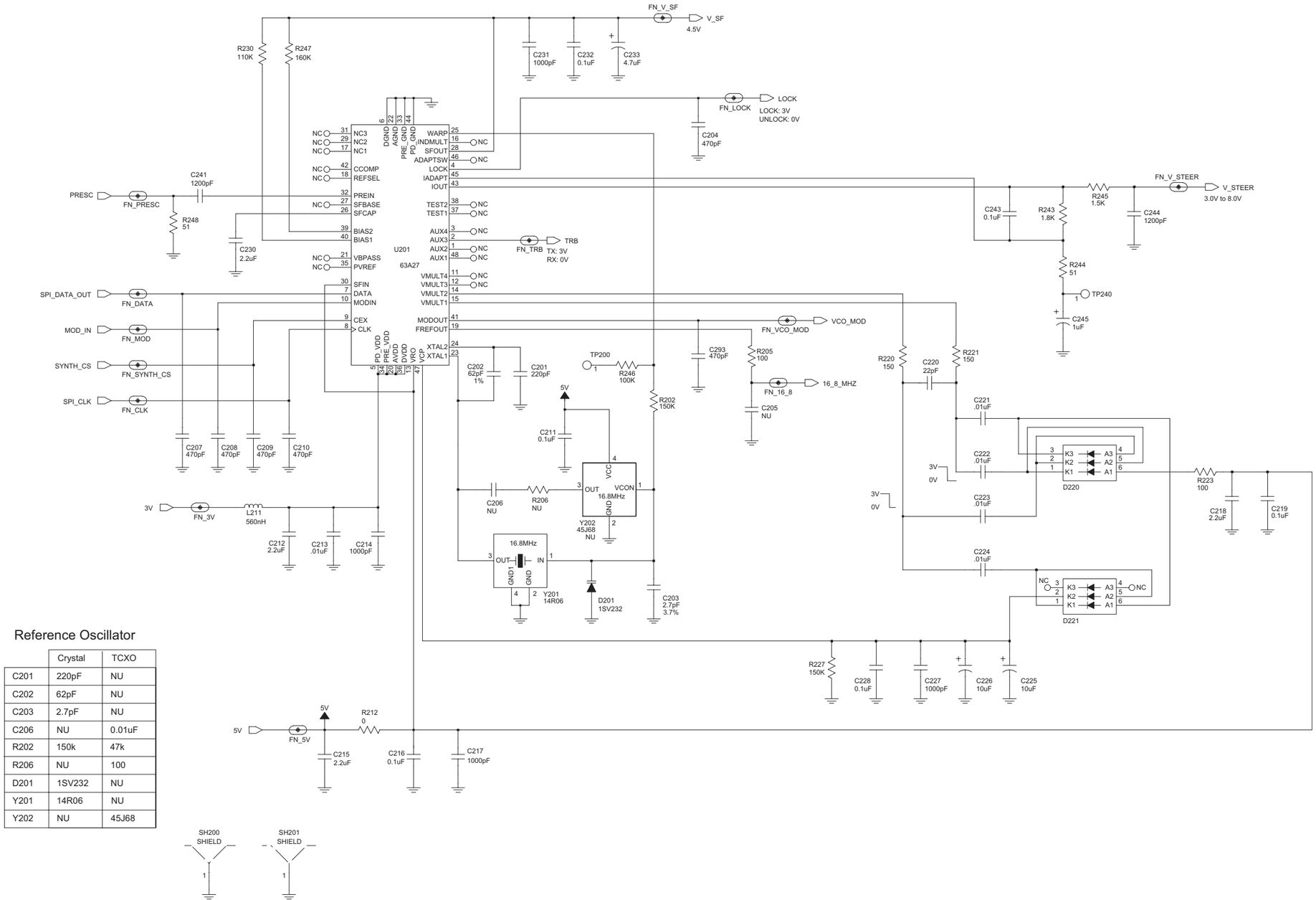


Figure 7-99. VHF (146–174 MHz) Receiver Back End Schematic Diagram (8486769Z08-G)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 7-100. VHF (146–174 MHz) Synthesizer Schematic Diagram (8486769Z08-G)

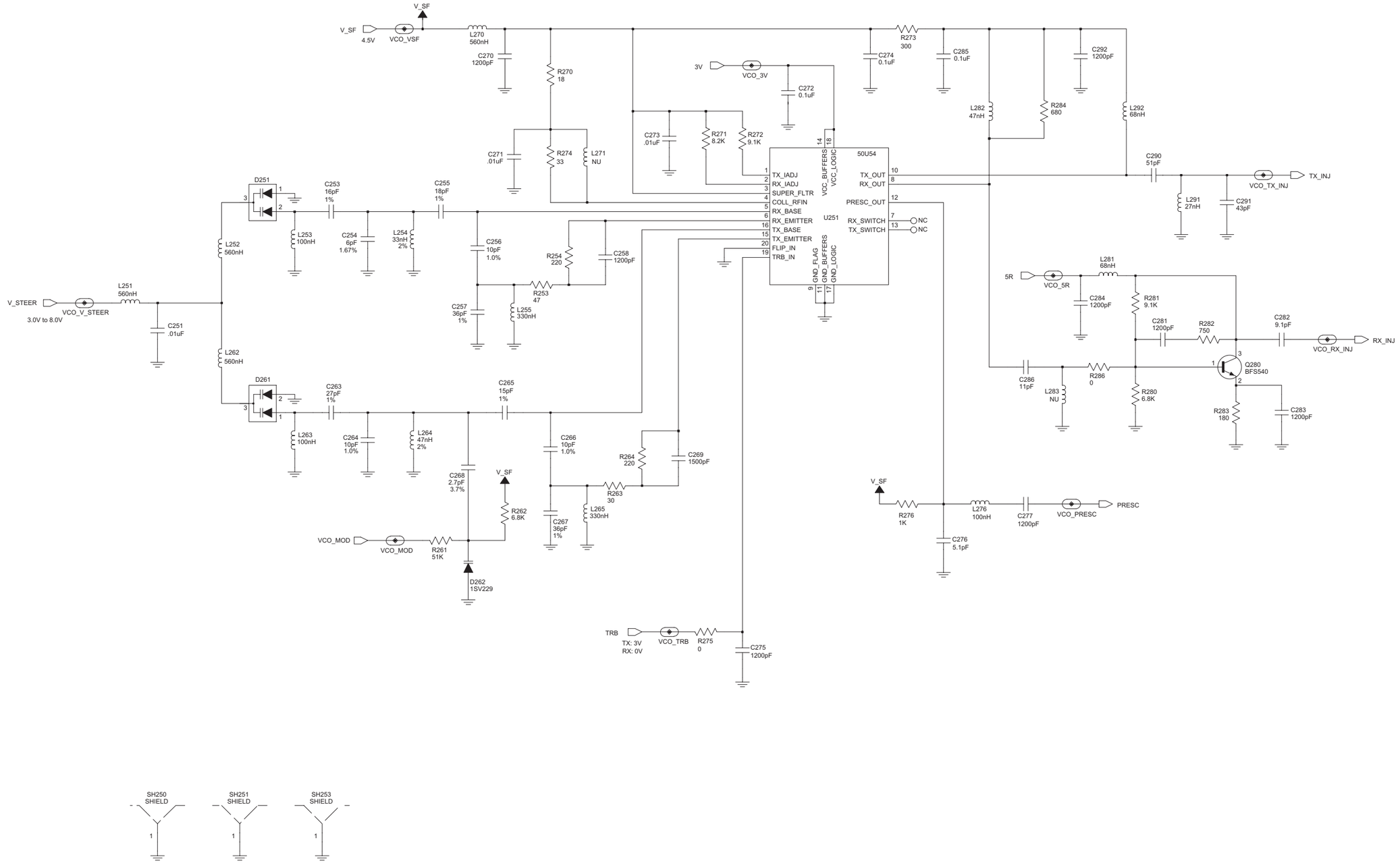


Figure 7-101. VHF (146–174 MHz) Voltage Controlled Oscillator Schematic Diagram (8486769Z08-G)

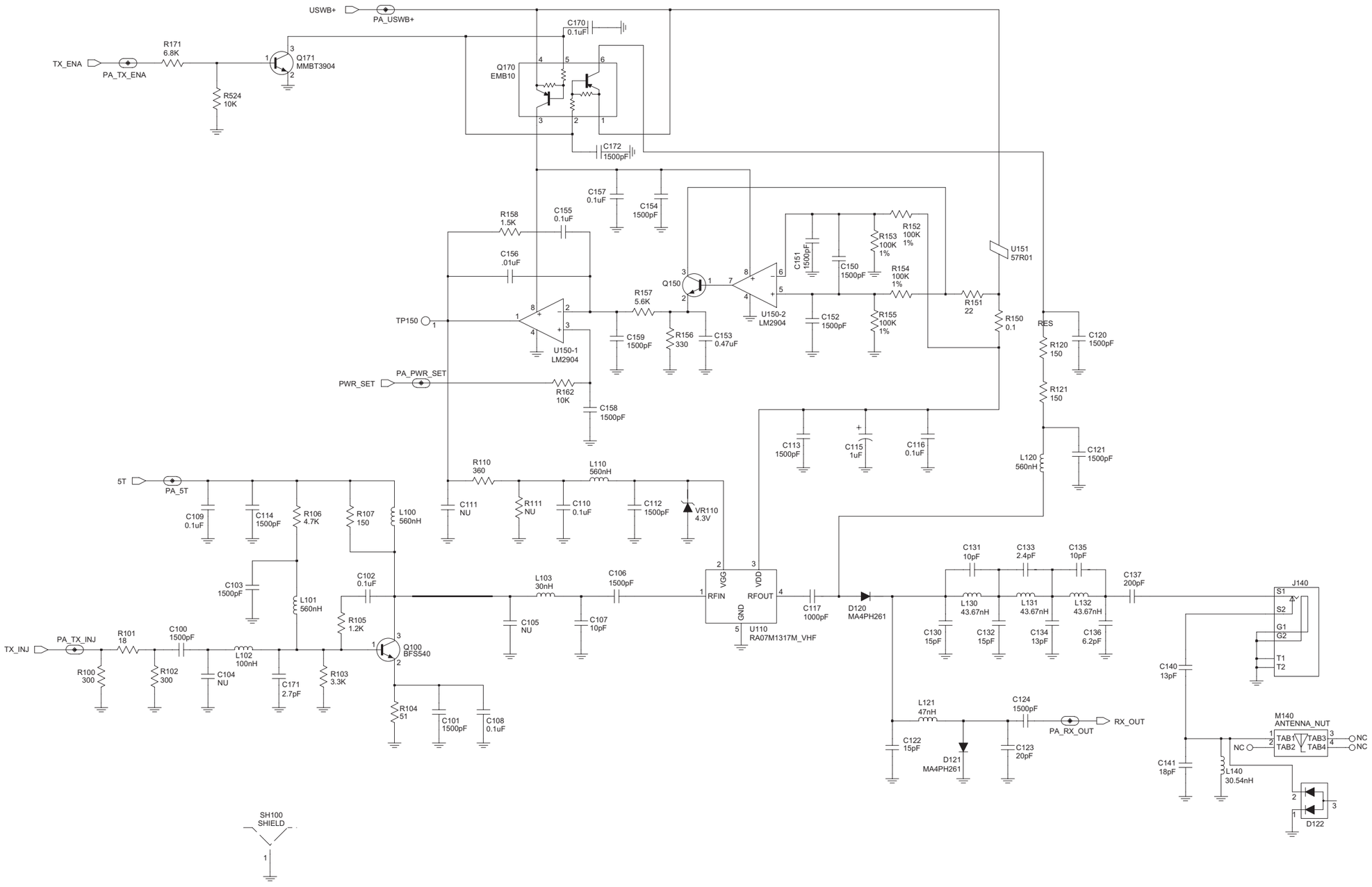


Figure 7-102. VHF (146–174 MHz) Transmitter and Power Control Schematic Diagram (8486769Z08-G)

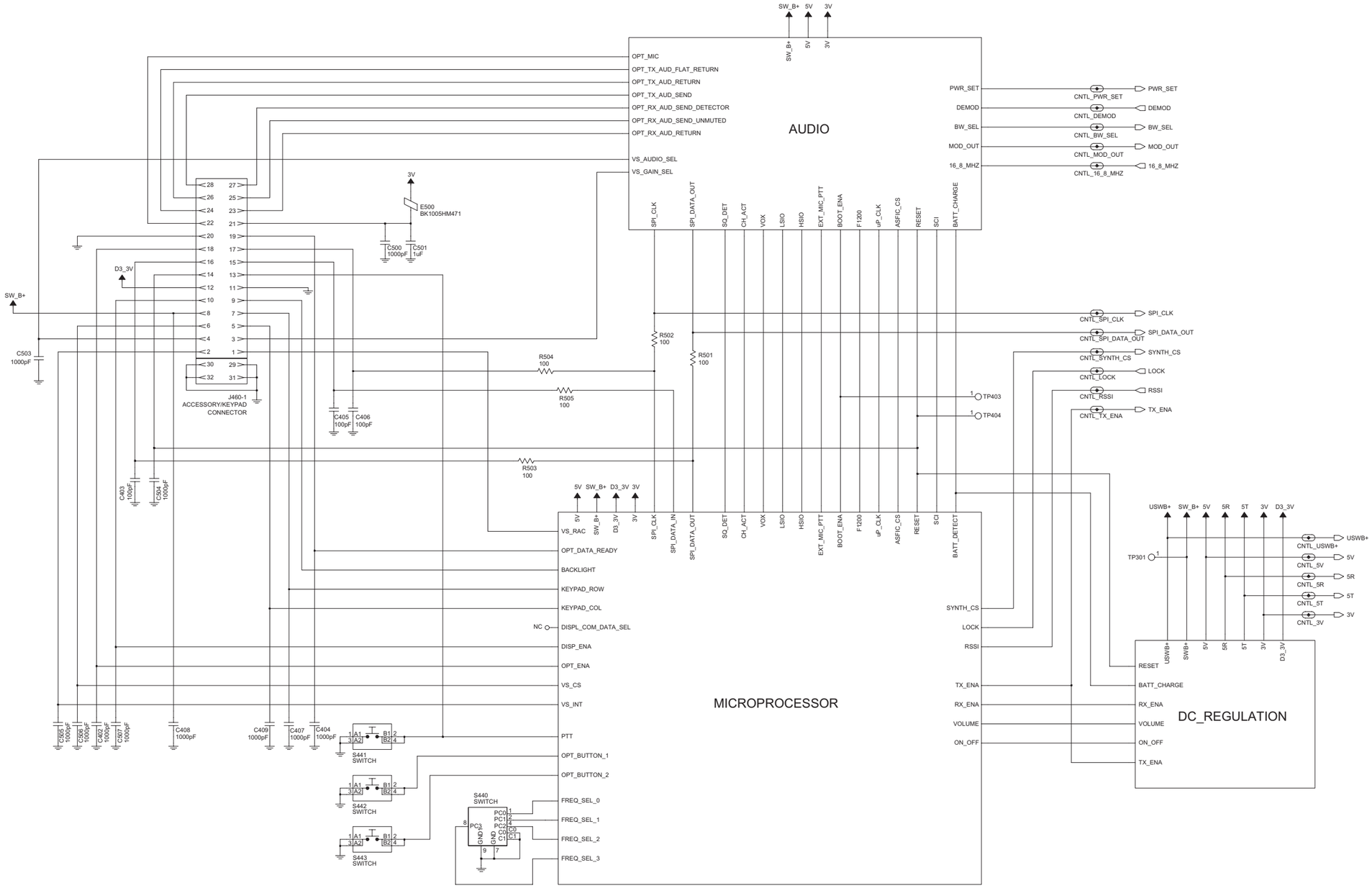


Figure 7-103. VHF (146–174 MHz) Controller Interconnect Schematic Diagram (8486769Z08-G)

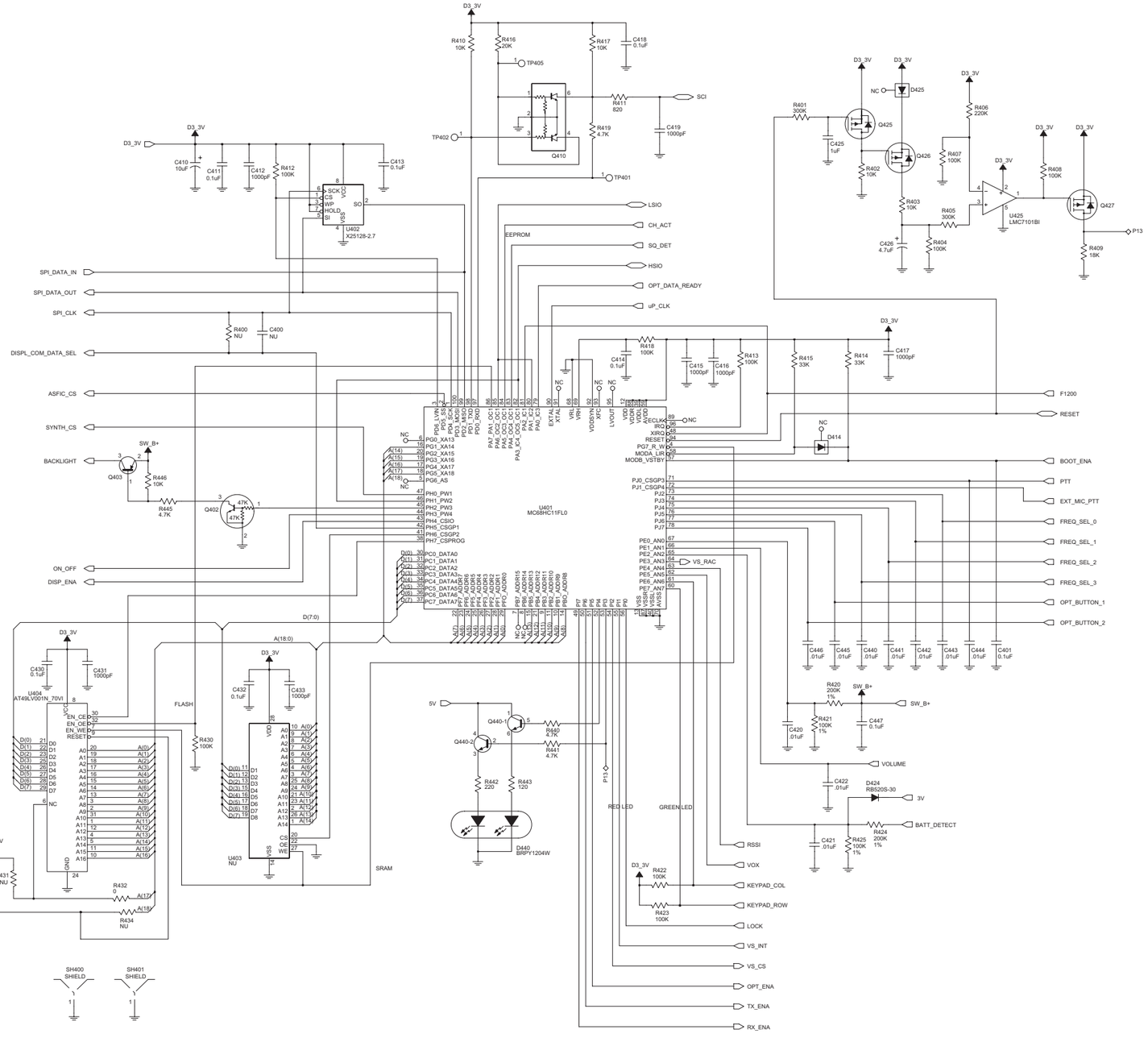


Figure 7-104. VHF (146–174 MHz) Microprocessor Circuitry Schematic Diagram (8486769Z08-G)

	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

Figure 7-105. VHF (146–174 MHz) Audio Circuitry Schematic Diagram (8486769Z08-G)

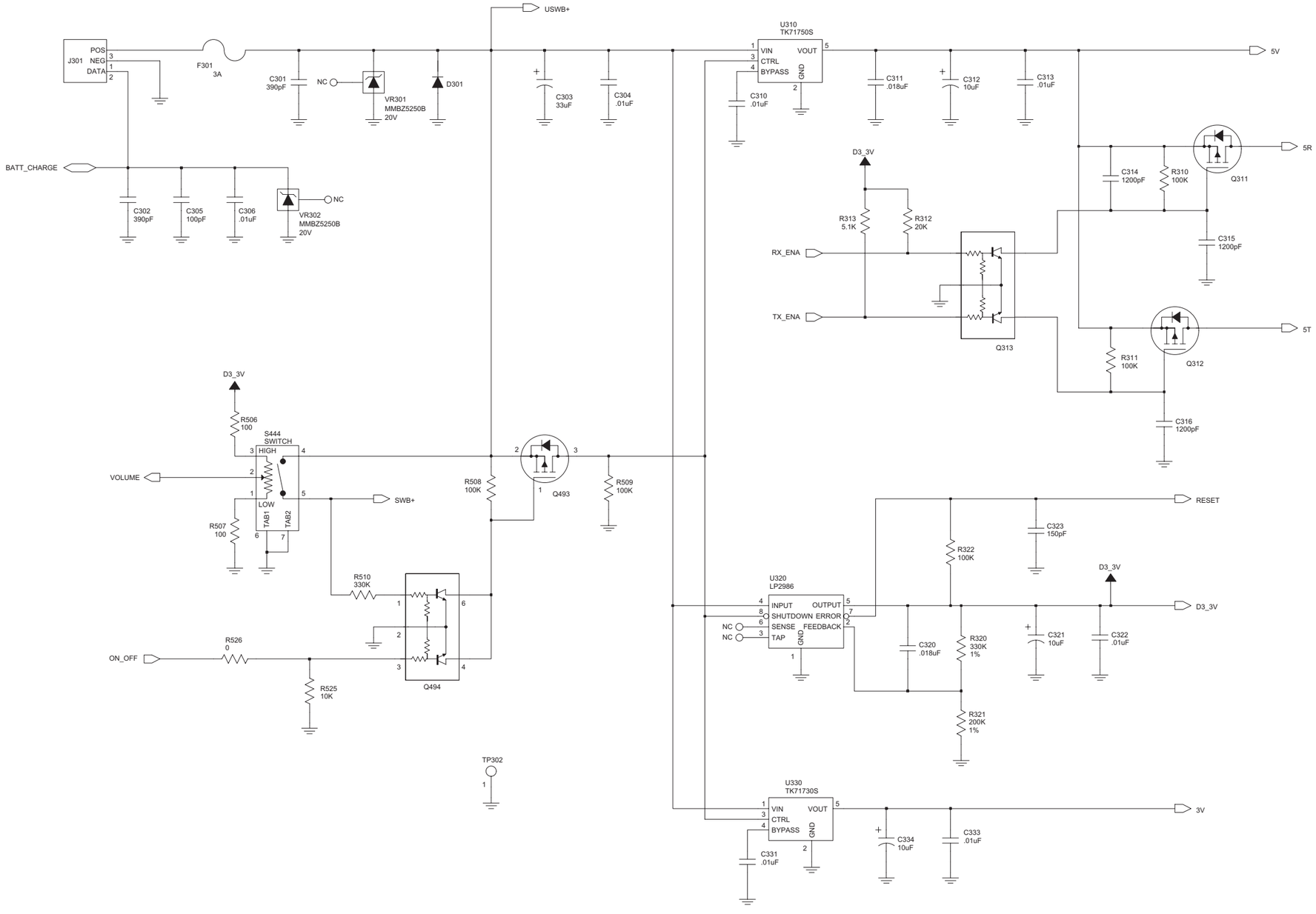


Figure 7-106. VHF (146–174 MHz) DC Regulation Schematic Diagram (8486769Z08-G)

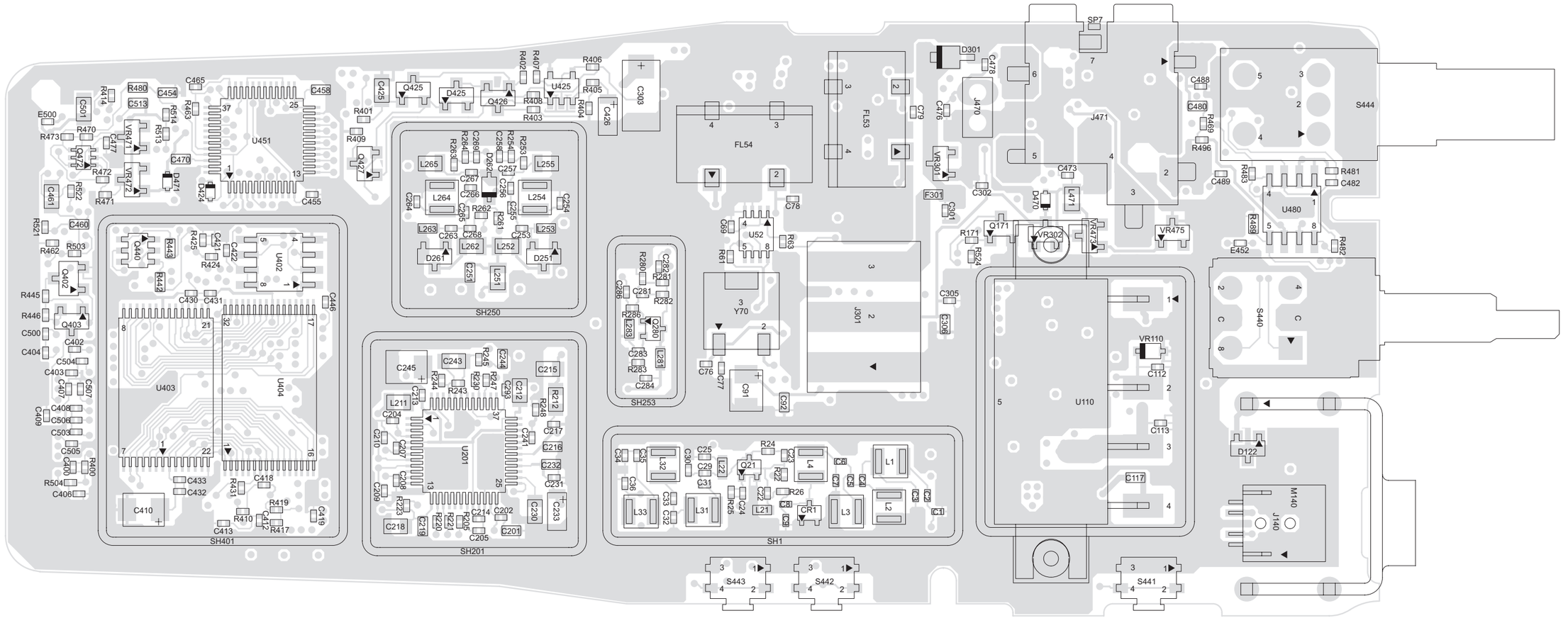


Figure 7-107. VHF (146–174 MHz) Board Component Side View (8486769Z08-G)

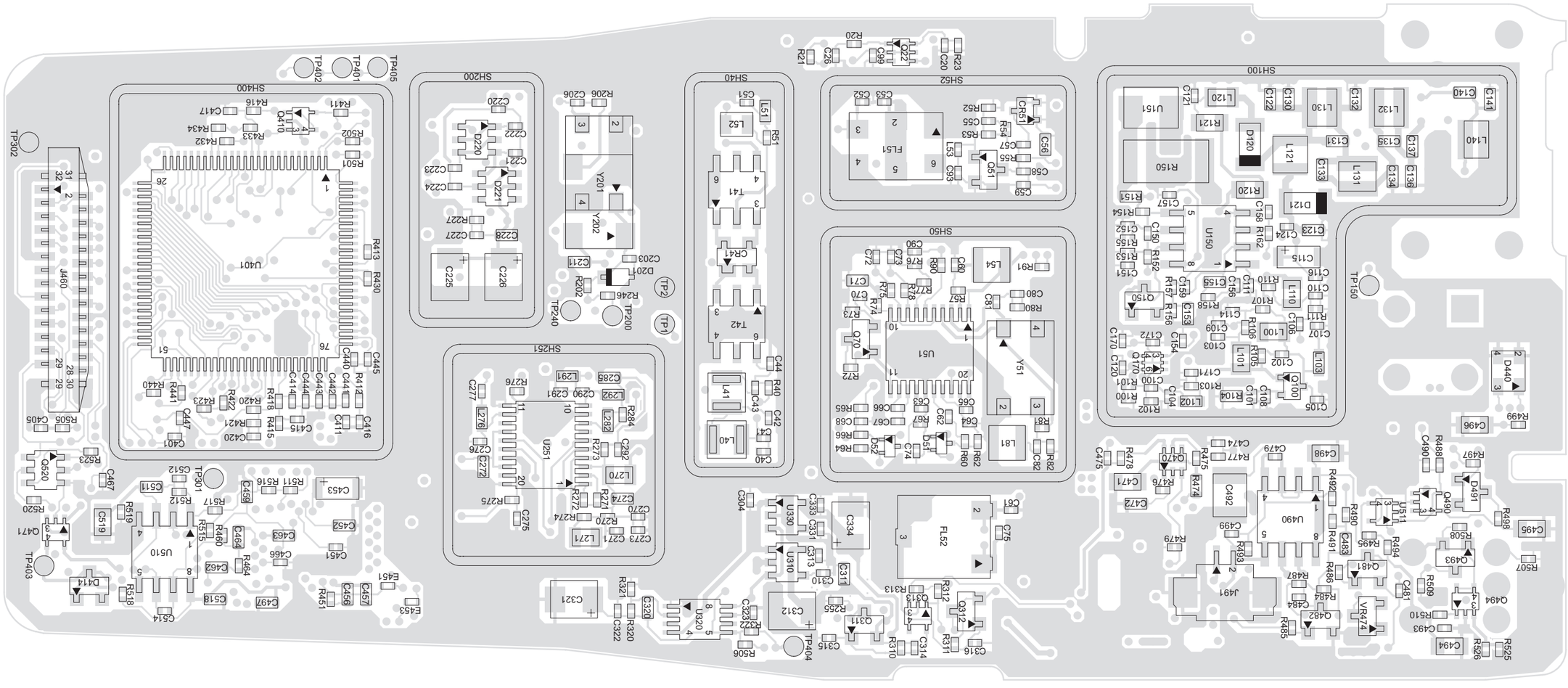


Figure 7-108. VHF (146–174 MHz) Board Solder Side View (8486769Z08-G)

VHF (146–174 MHz) Radio Parts List (8486769Z08-G)

Circuit Ref	Motorola Part No.	Description
C1	2115153H41	CAP,CERAMIC CHIP,22PF, +1%,-1%,50V-
C2	2115153H46	CAP, CERAMIC, COG
C3	2115153H49	CAP, CERAMIC, COG
C4	2115153H37	CAP, CERAMIC, COG
C5	2115153H14	CAP, CERAMIC, COG
C6	2115153H37	CAP, CERAMIC, COG
C7	2115153H45	CAP, CERAMIC, COG
C8	2115153H44	CAP, CERAMIC, COG
C9	NOT PLACED	64AM DUMMY PART NUMBER
C20	2113945A09	CAP CER CHP 1000PF 50V 10%
C22	2113945A09	CAP CER CHP 1000PF 50V 10%
C23	2113945A09	CAP CER CHP 1000PF 50V 10%
C24	NOT PLACED	64AM DUMMY PART NUMBER
C25	2113945A09	CAP CER CHP 1000PF 50V 10%
C26	2113945A09	CAP CER CHP 1000PF 50V 10%
C29	2115153H27	CAP, CERAMIC, COG
C30	2115153H42	CAP, CERAMIC, COG
C31	2115153H44	CAP, CERAMIC, COG
C32	2115153H51	CAP, CERAMIC, COG
C33	2115153H42	CAP, CERAMIC, COG
C34	2115153H51	CAP, CERAMIC, COG
C35	2115153H43	CAP, CERAMIC, COG
C36	2115153H42	CAP, CERAMIC, COG
C40	2115153H40	CAP, CERAMIC, COG
C41	2115153H37	CAP, CERAMIC, COG
C42	2115153H46	CAP, CERAMIC, COG
C43	2115153H37	CAP, CERAMIC, COG
C44	2115153H40	CAP, CERAMIC, COG
C51	2113944A38	CAP CER CHP 82.0PF 50V 5%
C52	2115153H39	CAP, CERAMIC, COG
C53	2115153H26	CAP, CERAMIC, COG
C55	2113946K02	CAP CER CHP 0.10UF 16V
C56	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C57	2113946K02	CAP CER CHP 0.10UF 16V
C58	2113944A15	CAP CER CHP 3.9PF 50V +/- 0.25PF
C59	2113944A11	CAP CER CHP 2.7PF 50V +/- 0.25PF
C60	2113946K02	CAP CER CHP 0.10UF 16V
C61	2113944A36	CAP CER CHP 68.0PF 50V 5%
C62	2113946K02	CAP CER CHP 0.10UF 16V
C63	2113946K02	CAP CER CHP 0.10UF 16V
C64	2113946K02	CAP CER CHP 0.10UF 16V
C65	2113946K02	CAP CER CHP 0.10UF 16V
C66	2113946K02	CAP CER CHP 0.10UF 16V
C67	2113946K02	CAP CER CHP 0.10UF 16V
C68	2113946K02	CAP CER CHP 0.10UF 16V
C69	2113946K02	CAP CER CHP 0.10UF 16V
C70	2113944A87	CAP,FXD,130PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,P
C71	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C72	2113946K02	CAP CER CHP 0.10UF 16V
C73	2113945A13	CAP CER CHP 4700PF 50V 10%
C74	2113944A33	CAP CER CHP 47.0PF 50V 5%
C75	2113944A31	CAP CER CHP 33.0PF 50V 5%
C76	2113944A34	CAP CER CHP 56.0PF 50V 5%
C77	NOT PLACED	64AM DUMMY PART NUMBER
C78	2113944A32	CAP CER CHP 39.0PF 50V 5%
C79	2113944A32	CAP CER CHP 39.0PF 50V 5%
C80	2115153H41	CAP,CERAMIC CHIP,22PF, +1%,-1%,50V-
C81	2115153H45	CAP, CERAMIC, COG
C82	2115153H45	CAP, CERAMIC, COG
C90	2113946K02	CAP CER CHP 0.10UF 16V
C91	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C92	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C93	NOT PLACED	64AM DUMMY PART NUMBER
C99	2113946K02	CAP CER CHP 0.10UF 16V
C100	2113945A10	CAP CER CHP 1500PF 50V 10%
C101	2113945A10	CAP CER CHP 1500PF 50V 10%
C102	2113946K02	CAP CER CHP 0.10UF 16V
C103	2113945A10	CAP CER CHP 1500PF 50V 10%
C104	NOT PLACED	64AM DUMMY PART NUMBER
C105	NOT PLACED	64AM DUMMY PART NUMBER
C106	2113945A10	CAP CER CHP 1500PF 50V 10%
C107	2113944A25	CAP CER CHP 10.0PF 50V +/- 0.5PF
C108	2113946K02	CAP CER CHP 0.10UF 16V
C109	2113946K02	CAP CER CHP 0.10UF 16V
C110	2113946K02	CAP CER CHP 0.10UF 16V
C111	NOT PLACED	64AM DUMMY PART NUMBER
C112	2113945A10	CAP CER CHP 1500PF 50V 10%
C113	2113945A10	CAP CER CHP 1500PF 50V 10%
C114	2113945A10	CAP CER CHP 1500PF 50V 10%
C115	2313960B01	CAP,FXD,1UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,87MA,E
C116	2113946K02	CAP CER CHP 0.10UF 16V
C117	2113945L25	CAP,FXD,1000PF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C120	2113945A10	CAP CER CHP 1500PF 50V 10%
C121	2113945A10	CAP CER CHP 1500PF 50V 10%
C122	2113944C32	CAP CER CHP 15.0PF 50V 5%
C123	2113944C32	CAP CER CHP 15.0PF 50V 5%
C124	2113945A10	CAP CER CHP 1500PF 50V 10%
C130	2113944C31	CAP CER CHP 12.0PF 50V 5%
C131	2113944C18	CAP CER CHP 3.3PF 50V +/- 0.25PF
C132	2113944C35	CAP CER CHP 27.0PF 50V 5%
C133	2113944C18	CAP CER CHP 3.3PF 50V +/- 0.25PF
C134	2113944C35	CAP CER CHP 27.0PF 50V 5%
C135	2113944C20	CAP CER CHP 3.9PF 50V +/- 0.25PF
C136	2113944C78	CAP,FXD,13PF,+5%,-5%, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX,PB
C137	2113944C89	CAP,FXD,200PF,+5%,-5%, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX,P
C140	2113944C78	CAP,FXD,13PF,+5%,-5%, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX,PB
C141	2113944C33	CAP CER CHP 18.0PF 50V 5%
C150	2113945A10	CAP CER CHP 1500PF 50V 10%
C151	2113945A10	CAP CER CHP 1500PF 50V 10%
C152	2113945A10	CAP CER CHP 1500PF 50V 10%
C153	2113946L04	CAP CER CHP 0.47UF 16V
C154	2113945A10	CAP CER CHP 1500PF 50V 10%
C155	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C156	2113945B02	CAP CER CHP 10,000PF 25V 10%
C157	2113946K02	CAP CER CHP 0.10UF 16V
C158	2113945A10	CAP CER CHP 1500PF 50V 10%
C159	2113945A10	CAP CER CHP 1500PF 50V 10%
C170	2113946K02	CAP CER CHP 0.10UF 16V
C171	2113944A11	CAP CER CHP 2.7PF 50V +/- 0.25PF
C172	2113945A10	CAP CER CHP 1500PF 50V 10%
C201	2113944C02	CAP CER CHP 220.0PF 50V 5%
C202	2115153H52	CAP, CERAMIC, COG
C203	2115153H13	CAP, CERAMIC, COG
C204	2113945A05	CAP CER CHP 470PF 50V 10%
C205	NOT PLACED	64AM DUMMY PART NUMBER
C206	NOT PLACED	64AM DUMMY PART NUMBER
C207	2113945A05	CAP CER CHP 470PF 50V 10%
C208	2113945A05	CAP CER CHP 470PF 50V 10%
C209	2113945A05	CAP CER CHP 470PF 50V 10%

Circuit Ref	Motorola Part No.	Description
C210	2113945A05	CAP CER CHP 470PF 50V 10%
C211	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C212	2113946N03	CAP CER CHP 2.2UF 16V
C213	2113945B02	CAP CER CHP 10,000PF 25V 10%
C214	2113945A09	CAP CER CHP 1000PF 50V 10%
C215	2113946N03	CAP CER CHP 2.2UF 16V
C216	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C217	2113945A09	CAP CER CHP 1000PF 50V 10%
C218	2113946N03	CAP CER CHP 2.2UF 16V
C219	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C220	2113944A29	CAP CER CHP 22.0PF 50V 5%
C221	2113945B02	CAP CER CHP 10,000PF 25V 10%
C222	2113945B02	CAP CER CHP 10,000PF 25V 10%
C223	2113945B02	CAP CER CHP 10,000PF 25V 10%
C224	2113945B02	CAP CER CHP 10,000PF 25V 10%
C225	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C226	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C227	2113945A09	CAP CER CHP 1000PF 50V 10%
C228	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C230	2113946N03	CAP CER CHP 2.2UF 16V
C231	2113945A09	CAP CER CHP 1000PF 50V 10%
C232	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C233	2313960B30	CAP,FXD,4.7UF,+10%,-10%, 10V-DC,SM,-55DEG CMIN, 125DEG CMAX,122MA
C241	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C243	2113945G91	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0805,X7R,-55DEG CMIN,125DEG CMAX
C244	2113945L27	CAP,FXD,1200PF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C245	2313960C26	CAP,FXD,1UF,+10%,-10%, 35V-DC,SM,-55DEG CMIN, 125DEG CMAX,114MA,E
C251	2113945L49	CAP,FXD,.01UF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX,P
C253	2115153H38	CAP, CERAMIC, COG
C254	2115153H15	CAP, CERAMIC, COG
C255	2115153H39	CAP, CERAMIC, COG
C256	2115153H27	CAP, CERAMIC, COG
C257	2115153H46	CAP, CERAMIC, COG
C258	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C263	2115153H43	CAP, CERAMIC, COG
C264	2115153H19	CAP, CERAMIC, COG
C265	2115153H37	CAP, CERAMIC, COG
C266	2115153H27	CAP, CERAMIC, COG
C267	2115153H46	CAP, CERAMIC, COG
C268	2115153H13	CAP, CERAMIC, COG
C269	2113945A10	CAP CER CHP 1500PF 50V 10%
C270	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C271	2113945B02	CAP CER CHP 10,000PF 25V 10%
C272	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C273	2113945B02	CAP CER CHP 10,000PF 25V 10%
C274	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C275	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C276	2113944A18	CAP CER CHP 5.1PF 50V +/- 0.5PF
C277	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C281	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C282	2113944A24	CAP CER CHP 9.1PF 50V +/- 0.5PF
C283	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C284	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C285	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C286	2113944A77	CAP,FXD,11PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C290	2113944A85	CAP,FXD,51PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C291	2113944A83	CAP,FXD,36PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C292	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C293	2113945A05	CAP CER CHP 470PF 50V 10%
C301	2113945A04	CAP CER CHP 390PF 50V 10%
C302	2113945A04	CAP CER CHP 390PF 50V 10%
C303	2313960F04	CAP,FXD,33UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,303MA
C304	2113945B02	CAP CER CHP 10,000PF 25V 10%
C305	2113944A40	CAP CER CHP 100.0PF 50V 5%
C306	2113945L49	CAP,FXD,.01UF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX,P
C310	2113945B02	CAP CER CHP 10,000PF 25V 10%
C311	2113945C21	CAP,FXD,.018UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMA
C312	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C313	2113945B02	CAP CER CHP 10,000PF 25V 10%
C314	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C315	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C316	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C320	2113945C21	CAP,FXD,.018UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMA
C321	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C322	2113945B02	CAP CER CHP 10,000PF 25V 10%
C323	2113944A42	CAP CER CHP 150.0PF 50V 5%
C331	2113945B02	CAP CER CHP 10,000PF 25V 10%
C333	2113945B02	CAP CER CHP 10,000PF 25V 10%
C334	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C400	NOT PLACED	64AM DUMMY PART NUMBER
C401	2113946K02	CAP CER CHP 0.10UF 16V
C402	2113945A09	CAP CER CHP 1000PF 50V 10%
C403	2113944A40	CAP CER CHP 100.0PF 50V 5%
C404	2113945A09	CAP CER CHP 1000PF 50V 10%
C405	2113944A40	CAP CER CHP 100.0PF 50V 5%
C406	2113944A40	CAP CER CHP 100.0PF 50V 5%
C407	2113945A09	CAP CER CHP 1000PF 50V 10%
C408	2113945A09	CAP CER CHP 1000PF 50V 10%
C409	2113945A09	CAP CER CHP 1000PF 50V 10%

Circuit Ref	Motorola Part No.	Description
C410	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C411	2113946K02	CAP CER CHP 0.10UF 16V
C412	2113945A09	CAP CER CHP 1000PF 50V 10%
C413	2113946K02	CAP CER CHP 0.10UF 16V
C414	2113946K02	CAP CER CHP 0.10UF 16V
C415	2113945A09	CAP CER CHP 1000PF 50V 10%
C416	2113945A09	CAP CER CHP 1000PF 50V 10%
C417	2113945A09	CAP CER CHP 1000PF 50V 10%
C418	2113946K02	CAP CER CHP 0.10UF 16V
C419	2113945A09	CAP CER CHP 1000PF 50V 10%
C420	2113945B02	CAP CER CHP 10,000PF 25V 10%
C421	2113945B02	CAP CER CHP 10,000PF 25V 10%
C422	2113945B02	CAP CER CHP 10,000PF 25V 10%
C425	2113946E02	CAP CER CHP 1.0UF 16V 10%
C426	2313960B01	CAP,FXD,1UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,87MA,E
C430	2113946K02	CAP CER CHP 0.10UF 16V
C431	2113945A09	CAP CER CHP 1000PF 50V 10%
C432	2113946K02	CAP CER CHP 0.10UF 16V
C433	2113945A09	CAP CER CHP 1000PF 50V 10%
C440	2113945B02	CAP CER CHP 10,000PF 25V 10%
C441	2113945B02	CAP CER CHP 10,000PF 25V 10%
C442	2113945B02	CAP CER CHP 10,000PF 25V 10%
C443	2113945B02	CAP CER CHP 10,000PF 25V 10%
C444	2113945B02	CAP CER CHP 10,000PF 25V 10%
C445	2113945B02	CAP CER CHP 10,000PF 25V 10%
C446	2113945B02	CAP CER CHP 10,000PF 25V 10%
C447	2113946K02	CAP CER CHP 0.10UF 16V
C451	2113946K02	CAP CER CHP 0.10UF 16V
C452	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C453	2313960B30	CAP,FXD,4.7UF,+10%,-10%, 10V-DC,SM,-55DEG CMIN, 125DEG CMAX,122MA
C454	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C455	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C456	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C457	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C458	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C459	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C460	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C461	2113946F03	CAP CER CHP 4.7UF 6.3V 10%
C462	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C463	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C464	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C465	2113945A09	CAP CER CHP 1000PF 50V 10%
C466	NOT PLACED	64AM DUMMY PART NUMBER
C467	2113945A60	CAP,FXD,1200PF,+10%, -10%, 50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C470	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C471	2113946N03	CAP CER CHP 2.2UF 16V
C472	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C473	2113944A42	CAP CER CHP 150.0PF 50V 5%
C474	2113944A42	CAP CER CHP 150.0PF 50V 5%
C475	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C476	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C477	2113946K02	CAP CER CHP 0.10UF 16V
C478	2113944A42	CAP CER CHP 150.0PF 50V 5%
C479	2113944A42	CAP CER CHP 150.0PF 50V 5%
C480	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C481	NOT PLACED	64AM DUMMY PART NUMBER
C482	NOT PLACED	64AM DUMMY PART NUMBER
C483	2113946C02	CAP CER CHP 0.22UF 10V 10%
C484	NOT PLACED	64AM DUMMY PART NUMBER
C488	2113945A05	CAP CER CHP 470PF 50V 10%
C489	2113945A05	CAP CER CHP 470PF 50V 10%
C490	2113945A05	CAP CER CHP 470PF 50V 10%
C492	2113955E37	CAP,FXD,10UF,+10%,-10%, 16V-DC,1210,X7R,-55DEG CMIN,125DEG CMAX
C493	2113945A09	CAP CER CHP 1000PF 50V 10%
C494	2113946N03	CAP CER CHP 2.2UF 16V
C495	2113946N02	CAP CER CHP 1.0UF 16V
C496	2113946N02	CAP CER CHP 1.0UF 16V
C497	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C498	2113946N02	CAP CER CHP 1.0UF 16V
C499	2113944A32	CAP CER CHP 39.0PF 50V 5%
C500	2113945A09	CAP CER CHP 1000PF 50V 10%
C501	2113946N02	CAP CER CHP 1.0UF 16V
C503	2113945A09	CAP CER CHP 1000PF 50V 10%
C504	2113945A09	CAP CER CHP 1000PF 50V 10%
C505	2113945A09	CAP CER CHP 1000PF 50V 10%
C506	2113945A09	CAP CER CHP 1000PF 50V 10%
C507	2113945A09	CAP CER CHP 1000PF 50V 10%
C511	2113944C02	CAP CER CHP 220.0PF 50V 5%
C512	2113944A21	CAP CER CHP 6.8PF 50V +/- 0.5PF
C513	2113944C02	CAP CER CHP 220.0PF 50V 5%
C514	2113944A79	CAP,FXD,16PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C518	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C519	2113946N02	CAP CER CHP 1.0UF 16V
CR1	4813974A19	DIODE ARRAY,MXR,SM, SOT-323,7V,.2W,SHTK,2, PB-FREE
CR41	4815923H01	SCHOTTKY DIODE-NEW LEADFREE
CR51	4813974A19	DIODE ARRAY,MXR,SM, SOT-323,7V,.2W,SHTK,2, PB-FREE
D51	4815047H01	BAND SWITCHIND DIODE,ROHM DAN
D52	4815047H01	BAND SWITCHIND DIODE,ROHM DAN
D120	4880973Z02	PIN DIODE
D121	4880973Z02	PIN DIODE
D122	4813978C06	DIODE ARRAY,SIGNL/SWG, BD2836,SM,SOT-23,100MA, 75V,.225W,SHTK,2,PB
D201	4815072H01	DIODE VARACTOR
D220	4815011H01	DIODE TRIPLE
D221	4815011H01	DIODE TRIPLE
D251	4885094Y01	DIODE VARACTOR ISV228 W18
D261	4885094Y01	DIODE VARACTOR ISV228 W18
D262	4885055Y01	DIODE VARACTOR PB-FREE

Circuit Ref	Motorola Part No.	Description
D301	4815713H01	DIODE SCHOTTKY 1A 20V PWRMITE
D414	4816064H01	SOT SMBD1022 RH29M19 LH PB-FREE
D424	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D425	4816064H01	SOT SMBD1022 RH29M19 LH PB-FREE
D440	4805729G49	DIODE RED/YEL
D470	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D471	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D491	NOT PLACED	64AM DUMMY PART NUMBER
E451	2480640Z01	SURFACE MOUNT FERRITE BEAD
E452	2480640Z01	SURFACE MOUNT FERRITE BEAD
E453	2480640Z01	SURFACE MOUNT FERRITE BEAD
E500	2480640Z01	SURFACE MOUNT FERRITE BEAD
F301	6515076H01	FUSE CHIP SMT TR/1608FF 3A
FL51	9180022M11	XTAL FILTER 44.85MHZ
FL52	9180468V04	SMD455KHZ 4 ELEMENT CER FLTR
FL53	9115811H03	SMD455KHZ 6 ELEMENT
FL54	9115811H01	SMD455KHZ 6 ELEMENT
J140	0986428Z02	CONNECTOR, RF
J301	0986565Z02	CONNECTOR CONTACT BATTERY
J460	0986615Z02	CONN,ZIF,F,28CONT,,TIN,,,CBL
J470	0985818A02	CONNECTOR, MICROPHONE, 2-PIN
J471	0980683Z03	AUDIO JACK (MONO & STEREO)
J491	2815162H01	HEADER SMT HORZ MOUNT LEAD-FREE
L1	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L2	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L3	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L4	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L21	NOT PLACED	64AM DUMMY PART NUMBER
L22	2414017N24	IDCTR,CHIP,100NH,5%,300MA,2OHM,CER,14 Q, 700MHZ SRF,SM,0603,P
L31	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L32	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L33	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L40	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L41	2414015C09	IDCTR,CHIP,68NH,2%,1.1MA,.13OHM,CER,80Q,1.15GHZ SRF,SM,1008,P
L51	2414017N26	IDCTR,CHIP,150NH,5%,200MA,2.4OHM,CER,11 Q, 550MHZ SRF,SM,0603
L52	2414032F44	IDCTR,WW,680NH,10%,130MA,4OHM,CER,30 Q, 570MHZ SRF,SM,LEAD-F
L53	2113944A41	CAP CER CHP 120.0PF 50V 5%
L54	2414015A25	IDCTR,FXD,1.2UH,2%,440MA,2OHM,CER,20 Q,200MHZ SRF,SM,1008,PB
L81	2414015A19	IDCTR,FXD,1UH,2%,460MA, 1.75OHM,CER,33 Q,290MHZ SRF,SM,1008,P
L100	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L101	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L102	2415429H36	CHIP INDUCTOR
L103	2415429H25	CHIP INDUCTOR
L110	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L120	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L121	2414032B49	IDCTR,WW,47NH,5%,1A,.16OHM,CER,50 Q,1.35GHZ SRF,SM,PB-FREE
L130	2479990N01	INDUCTOR,AIR WOUND, 43.67NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND(GREEN COLOUR)
L131	2479990N01	INDUCTOR,AIR WOUND, 43.67NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND(GREEN COLOUR)
L132	2479990N01	INDUCTOR,AIR WOUND, 43.67NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND(GREEN COLOUR)
L140	2479990M01	INDUCTOR,AIR WOUND, 30.54NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND(GREEN COLOUR)
L211	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L251	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L252	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L253	2415429H36	CHIP INDUCTOR
L254	2414015C05	IDCTR,FXD,33NH,2%,1.3MA, .09OHM,CER,75 Q,1.7GHZ SRF,SM,1008,P
L255	2414017K29	IDCTR,CHIP,330NH,5%,150MA,1.5OHM,CER,11 Q, 250MHZ SRF,SM,0805
L262	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L263	2415429H36	CHIP INDUCTOR
L264	2414015C07	IDCTR,FXD,47NH,2%,1.2MA, .12OHM,CER,75 Q,1.45GHZ SRF,SM,1008
L265	2414017K29	IDCTR,CHIP,330NH,5%,150MA,1.5OHM,CER,11 Q, 250MHZ SRF,SM,0805
L270	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L271	NOT PLACED	64AM DUMMY PART NUMBER
L276	2414017N24	IDCTR,CHIP,100NH,5%,300MA,2OHM,CER,14 Q, 700MHZ SRF,SM,0603,P
L281	2414017N22	IDCTR,CHIP,68NH,5%,400MA,1.2OHM,CER,14 Q, 800MHZ SRF,SM,0603
L282	2414017N20	IDCTR,CHIP,47NH,5%,500MA,.86OHM,CER,14 Q, 900MHZ SRF,SM,0603
L283	NOT PLACED	64AM DUMMY PART NUMBER
L291	2414017N17	IDCTR,CHIP,27NH,5%,600MA,.62OHM,CER,12 Q,1.2GHZ SRF,SM,0603
L292	2414017N22	IDCTR,CHIP,68NH,5%,400MA,1.2OHM,CER,14 Q, 800MHZ SRF,SM,0603
L471	2414017K30	IDCTR,CHIP,390NH,5%,150MA,1.8OHM,CER,11Q,200MHZSRF,SM,0805,P
M140	0286427Z02	NUT, ANTENNA
PASTE	1085674C03	PASTE/NC-SMQ230
Q21	4802245J95	BJT, NPN TRANSISTOR
Q22	4815267H01	DBRT UMT1NFTN
Q51	4802197J95	RF TRANSISTOR PBR941
Q70	4813973M07	XSTR,BIP GP SS,NPN, T3904,SM,SOT-23,SMT,40V, .225W,200MA,300MHZ
Q100	4802245J95	BJT, NPN TRANSISTOR
Q150	4813973M07	XSTR,BIP GP SS,NPN, T3904 ,SM,SOT-23,SMT,40V, .225W, 200MA,300MHZ
Q170	4809939C34	TSTR DUAL PNP EMB10T2R EMT6
Q171	4813973M07	XSTR,BIP GP SS,NPN, T3904,SM,SOT-23,SMT,40V, .225W,200MA,300MHZ
Q280	4802245J95	BJT, NPN TRANSISTOR
Q311	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q312	4885316E25	TSTR MOSFET P-CHAN TP0101T

Circuit Ref	Motorola Part No.	Description
Q313	4815066H01	UMG5N DIGITAL TRANSISTOR
Q402	4813973A42	XSTR,BIP GP SS,NPN,SM, SC-59,SMT,50V,.23W,100MA, PB-FREE
Q403	4813973A13	XSTR,GEN PURPOSE SMALL SIG,PNP, MMBT3906L, TO-236,4, PB-FREE
Q410	4815066H01	UMG5N DIGITAL TRANSISTOR
Q425	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q426	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q427	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q440	4815154H01	DUAL TRANS NPN
Q470	4815267H01	DBRT UMT1NFTN
Q471	4815066H01	UMG5N DIGITAL TRANSISTOR
Q472	4815267H01	DBRT UMT1NFTN
Q481	NOT PLACED	64AM DUMMY PART NUMBER
Q482	NOT PLACED	64AM DUMMY PART NUMBER
Q490	4815066H01	UMG5N DIGITAL TRANSISTOR
Q493	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q494	4815066H01	UMG5N DIGITAL TRANSISTOR
Q520	4815154H01	DUAL TRANS NPN
R20	0613952Z52	RES,MF,6.8KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R21	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R22	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R23	0613952Z58	RES,MF,22KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R24	0613952Q70	CER CHIP RES 750 OHM 5% 0402
R25	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R26	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R40	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R51	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R52	0613952R03	CER CHIP RES 12K OHM 5% 0402
R53	0613952R13	CER CHIP RES 33K OHM 5% 0402
R54	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R55	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R57	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R60	0613952Q82	CER CHIP RES 2400 OHM 5% 0402
R61	0613952R25	CER CHIP RES 100K OHM 5% 0402
R62	0613952Q85	CER CHIP RES 3300 OHM 5% 0402
R63	0613952R15	CER CHIP RES 39K OHM 5% 0402
R64	0613952R08	CER CHIP RES 20K OHM 5% 0402
R65	0613952R15	CER CHIP RES 39K OHM 5% 0402
R66	0613952R08	CER CHIP RES 20K OHM 5% 0402
R67	0613952R08	CER CHIP RES 20K OHM 5% 0402
R72	0613952Q63	CER CHIP RES 390 OHM 5% 0402
R73	0613952Q79	CER CHIP RES 1800 OHM 5% 0402
R74	0613952Q75	CER CHIP RES 1200 OHM 5% 0402
R75	0613952R03	CER CHIP RES 12K OHM 5% 0402
R76	0613952Z55	RES,MF,12KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R77	0613952Z53	RES,MF,8.2KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R78	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R80	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R81	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R82	NOT PLACED	64AM DUMMY PART NUMBER
R90	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R91	0613952Q78	CER CHIP RES 1600 OHM 5% 0402
R100	0613952Q60	CER CHIP RES 300 OHM 5% 0402
R101	0613952Q31	CER CHIP RES 18.0 OHM 5% 0402
R102	0613952Q60	CER CHIP RES 300 OHM 5% 0402
R103	0613952Q85	CER CHIP RES 3300 OHM 5% 0402
R104	0613952H42	CER CHIP RES 51.0 OHM 5% 0603
R105	0613952Q75	CER CHIP RES 1200 OHM 5% 0402
R106	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R107	0613952Q53	CER CHIP RES 150 OHM 5% 0402
R110	0613952Q62	CER CHIP RES 360 OHM 5% 0402
R111	0613952R01	CER CHIP RES 10K OHM 5% 0402
R120	0613958H53	CER CHIP RES 150 OHM 5% 0805
R121	0613958H53	CER CHIP RES 150 OHM 5% 0805
R150	0615043C01	RES POWER METAL STRIP W18 COMPLIANT
R151	0613952H33	CER CHIP RES 22.0 OHM 5% 0603
R152	0613952P01	CER CHIP RES 100K OHM 1% 0402
R153	0613952P01	CER CHIP RES 100K OHM 1% 0402
R154	0613952P01	CER CHIP RES 100K OHM 1% 0402
R155	0613952P01	CER CHIP RES 100K OHM 1% 0402
R156	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R157	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R158	0613952Q77	CER CHIP RES 1500 OHM 5% 0402
R162	0613952R01	CER CHIP RES 10K OHM 5% 0402
R171	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R202	0613952R29	CER CHIP RES 150K OHM 5% 0402
R205	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R206	NOT PLACED	64AM DUMMY PART NUMBER
R212	0613958J74	CER CHIP RES 0.0 OHM JMP 0805
R220	0613952Q53	CER CHIP RES 150 OHM 5% 0402
R221	0613952Q53	CER CHIP RES 150 OHM 5% 0402
R223	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R227	0613952R29	CER CHIP RES 150K OHM 5% 0402
R230	0613952R26	CER CHIP RES 110K OHM 5% 0402
R243	0613952Q79	CER CHIP RES 1800 OHM 5% 0402
R244	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R245	0613952Q77	CER CHIP RES 1500 OHM 5% 0402
R246	0613952R25	CER CHIP RES 100K OHM 5% 0402
R247	0613952R30	CER CHIP RES 160K OHM 5% 0402
R248	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R253	0613952Q41	CER CHIP RES 47.0 OHM 5% 0402
R254	0613952Q57	CER CHIP RES 220 OHM 5% 0402
R255	0613952Z46	RES,MF,3.9KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R261	0613952R18	CER CHIP RES 51K OHM 5% 0402
R262	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R263	0613952Q36	CER CHIP RES 30.0 OHM 5% 0402
R264	0613952Q57	CER CHIP RES 220 OHM 5% 0402
R270	0613952Q31	CER CHIP RES 18.0 OHM 5% 0402
R271	0613952Q95	CER CHIP RES 8200 OHM 5% 0402
R272	0613952Q96	CER CHIP RES 9100 OHM 5% 0402

Circuit Ref	Motorola Part No.	Description
R273	0613952Q60	CER CHIP RES 300 OHM 5% 0402
R274	0613952Q37	CER CHIP RES 33.0 OHM 5% 0402
R275	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R276	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R280	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R281	0613952Q96	CER CHIP RES 9100 OHM 5% 0402
R282	0613952Q70	CER CHIP RES 750 OHM 5% 0402
R283	0613952Q55	CER CHIP RES 180 OHM 5% 0402
R284	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R286	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R310	0613952R25	CER CHIP RES 100K OHM 5% 0402
R311	0613952R25	CER CHIP RES 100K OHM 5% 0402
R312	0613952R08	CER CHIP RES 20K OHM 5% 0402
R313	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R320	0613952Z80	RES,MF,330KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R321	0613952P30	CER CHIP RES 200K OHM 1% 0402
R322	0613952R25	CER CHIP RES 100K OHM 5% 0402
R400	NOT PLACED	64AM DUMMY PART NUMBER
R401	0613952R36	CER CHIP RES 300K OHM 5% 0402
R402	0613952R01	CER CHIP RES 10K OHM 5% 0402
R403	0613952R01	CER CHIP RES 10K OHM 5% 0402
R404	0613952R18	CER CHIP RES 51K OHM 5% 0402
R405	0613952R36	CER CHIP RES 300K OHM 5% 0402
R406	0613952R33	CER CHIP RES 220K OHM 5% 0402
R407	0613952R25	CER CHIP RES 100K OHM 5% 0402
R408	0613952R25	CER CHIP RES 100K OHM 5% 0402
R409	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R410	0613952R01	CER CHIP RES 10K OHM 5% 0402
R411	0613952Q71	CER CHIP RES 820 OHM 5% 0402
R412	0613952R25	CER CHIP RES 100K OHM 5% 0402
R413	0613952R25	CER CHIP RES 100K OHM 5% 0402
R414	0613952R13	CER CHIP RES 33K OHM 5% 0402
R415	0613952R13	CER CHIP RES 33K OHM 5% 0402
R416	0613952R08	CER CHIP RES 20K OHM 5% 0402
R417	0613952R01	CER CHIP RES 10K OHM 5% 0402
R418	0613952R25	CER CHIP RES 100K OHM 5% 0402
R419	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R420	0613952P30	CER CHIP RES 200K OHM 1% 0402
R421	0613952P01	CER CHIP RES 100K OHM 1% 0402
R422	0613952R25	CER CHIP RES 100K OHM 5% 0402
R423	0613952R25	CER CHIP RES 100K OHM 5% 0402
R424	0613952P30	CER CHIP RES 200K OHM 1% 0402
R425	0613952P01	CER CHIP RES 100K OHM 1% 0402
R430	0613952R25	CER CHIP RES 100K OHM 5% 0402
R431	NOT PLACED	64AM DUMMY PART NUMBER
R432	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R433	0613952R25	CER CHIP RES 100K OHM 5% 0402
R434	NOT PLACED	64AM DUMMY PART NUMBER
R440	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R441	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R442	0613952H57	CER CHIP RES 220 OHM 5% 0603
R443	0613952H51	CER CHIP RES 120 OHM 5% 0603
R445	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R446	0613952R01	CER CHIP RES 10K OHM 5% 0402
R451	0613952R17	CER CHIP RES 47K OHM 5% 0402
R460	0613952R10	CER CHIP RES 24K OHM 5% 0402
R462	0613952R10	CER CHIP RES 24K OHM 5% 0402
R463	0613952R10	CER CHIP RES 24K OHM 5% 0402
R464	0613952R12	CER CHIP RES 30K OHM 5% 0402
R469	0613952Q25	CER CHIP RES 10.0 OHM 5% 0402
R470	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R471	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R472	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R473	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R474	0613952H61	CER CHIP RES 330 OHM 5% 0603
R475	0613952R31	CER CHIP RES 180K OHM 5% 0402
R476	0613952R25	CER CHIP RES 100K OHM 5% 0402
R477	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R478	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R479	0613952R25	CER CHIP RES 100K OHM 5% 0402
R480	0613952G67	CER CHIP RES 0.0 +/-0.050 OHM
R481	NOT PLACED	64AM DUMMY PART NUMBER
R482	NOT PLACED	64AM DUMMY PART NUMBER
R483	NOT PLACED	64AM DUMMY PART NUMBER
R484	NOT PLACED	64AM DUMMY PART NUMBER
R485	NOT PLACED	64AM DUMMY PART NUMBER
R486	NOT PLACED	64AM DUMMY PART NUMBER
R487	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R488	0613952R37	CER CHIP RES 330K OHM 5% 0402
R489	NOT PLACED	64AM DUMMY PART NUMBER
R490	NOT PLACED	64AM DUMMY PART NUMBER
R491	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R492	0613952R10	CER CHIP RES 24K OHM 5% 0402
R493	0613952R37	CER CHIP RES 330K OHM 5% 0402
R494	0613952Z80	RES,MF,330KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R495	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R496	NOT PLACED	64AM DUMMY PART NUMBER
R497	NOT PLACED	64AM DUMMY PART NUMBER
R498	NOT PLACED	64AM DUMMY PART NUMBER
R499	NOT PLACED	64AM DUMMY PART NUMBER
R501	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R502	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R503	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R504	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R505	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R506	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R507	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R508	0613952R25	CER CHIP RES 100K OHM 5% 0402
R509	0613952R25	CER CHIP RES 100K OHM 5% 0402
R510	0613952R37	CER CHIP RES 330K OHM 5% 0402

Circuit Ref	Motorola Part No.	Description
R511	0613952R25	CER CHIP RES 100K OHM 5% 0402
R512	0613952R29	CER CHIP RES 150K OHM 5% 0402
R513	NOT PLACED	64AM DUMMY PART NUMBER
R514	0613952R25	CER CHIP RES 100K OHM 5% 0402
R515	NOT PLACED	64AM DUMMY PART NUMBER
R516	NOT PLACED	64AM DUMMY PART NUMBER
R517	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R518	0613952R33	CER CHIP RES 220K OHM 5% 0402
R519	0613952R25	CER CHIP RES 100K OHM 5% 0402
R520	0613952R25	CER CHIP RES 100K OHM 5% 0402
R521	NOT PLACED	64AM DUMMY PART NUMBER
R522	0613952R25	CER CHIP RES 100K OHM 5% 0402
R523	0613952R01	CER CHIP RES 10K OHM 5% 0402
R524	0613952R01	CER CHIP RES 10K OHM 5% 0402
R525	0613952R01	CER CHIP RES 10K OHM 5% 0402
R526	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
S440	4080710Z26	SWITCH, FREQUENCY (EPP)
S441	4070354A01	LIGHT TOUCH SWITCH-SMD
S442	4070354A01	LIGHT TOUCH SWITCH-SMD
S443	4070354A01	LIGHT TOUCH SWITCH-SMD
S444	1880619Z06	POTENTIOMETER, VOLUME
SH1	2686421Z02	SHIELD, FE, ELP
SH40	2686419Z02	SHIELD, MIXER, ELP
SH50	2686423Z02	SHIELD, 19 X 19 X 3.03 MM
SH52	2686424Z02	SHIELD, IF, ELP
SH100	2686418Z03	SHEILD, HARMONIC FILTER, ELP
SH200	2686424Z02	SHIELD, IF, ELP
SH201	2686423Z02	SHIELD, 19 X 19 X 3.03 MM
SH250	2686425Z02	SHIELD
SH251	2686425Z02	SHIELD
SH253	2686422Z02	SHIELD, BUFFER, ELP
SH400	2686420Z04	SHIELD, CONTROL, ELP
SH401	2686420Z03	SHIELD,CONTROL,ELP
SP7	1088791Y02	SOLDER PELLETS, LEAD FREE
T41	2515121H01	BALUN, TRANSFORMER W18 COMP
T42	2515121H01	BALUN, TRANSFORMER W18 COMP
U51	5115281H01	FM IF IC SA616 FROM PHILIPS
U52	5115070H01	IC 3-INV LMOS TC7W04FU
U110	0186438Z04	ASSY,AMP
U150	5114005A01	IC,OP AMP,2PER PKG,GP, SM,SO-8,PB-FREE
U151	2415954H02	INDUCTOR BEAD CHIP EPP WITH EPOXY
U201	5185177Y01	IC TESTED AT25016 48 PIN W18
U251	5171121L01	CUSTOM LOW VOLTAGE VCO BUFFER IC
U310	5115746H01	VOLTAGE REGULATOR, 5V
U320	5115679H01	IC VOLTAGE REGLTR LP2986
U330	5115745H01	VOLTAGE REGULATOR, 3V
U401	5185143E03	HC11FL0 (3V) ASIC MICRO-P
U402	5116648H01	128KBIT SERIAL SPI BUS EEPROM
U403	NOT PLACED	64AM DUMMY PART NUMBER
U404	51012084002	IC FLASH 4MBIT 3.3V 8MM14MM
U425	5115697H01	LOW PWR OP AMP W/RAIL TO RAIL
U451	5115062H01	IC ASFIC_CMP
U480	NOT PLACED	64AM DUMMY PART NUMBER
U490	5116029H01	1 W BTL AUDIO AMPLIFIER
U510	5114005A01	IC,OP AMP,2PER PKG,GP, SM,SO-8,PB-FREE
U511	4815066H01	UMG5N DIGITAL TRANSISTOR
VR110	4813977A55	DIODE,ZEN,MM3Z4V3,SM, SOD-323,4.3V,10MA,.2W, ZEN, PB-FREE
VR301	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR302	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR471	4813977M14	DIODE,ZEN,MBZ5235,SM, SOT-23,6.8V,10MA,.225W, ZEN,PB-FREE
VR472	4813977M05	DIODE,ZEN,MBZ5226,SM, SOT-23,3.3V,10MA,.225W, ZEN,PB-FREE
VR473	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR474	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR475	4813977M24	DIODE,ZEN,MBZ5245,SM, SOT-23,15V,10MA,.225W, ZEN,PB-FREE
Y51	4802245J84	XTAL 44.395MHZ, 3RD OT, SMD
Y70	9186145B02	CER.DISCR. CDBCA455CX36-TC
Y201	4880114R08	CRYSTAL, QUARTZ 16.8 MHZ
Y202	NOT PLACED	64AM DUMMY PART NUMBER

Notes

Chapter 8 403–440 MHz UHF Theory Of Operation

8.1 Introduction

This chapter provides a detailed theory of operation for the radio components. Schematic diagrams for the circuits described in the following paragraphs are located in Chapter 13 of this manual.

8.2 UHF Receiver

The UHF receiver covers the range of 403–440 MHz and provides switchable IF bandwidth for use with 20/25/30 kHz or 12.5 kHz channel spacing systems. The receiver is divided into two major blocks, as shown in Figure 8-1.

- Front End
- Back End

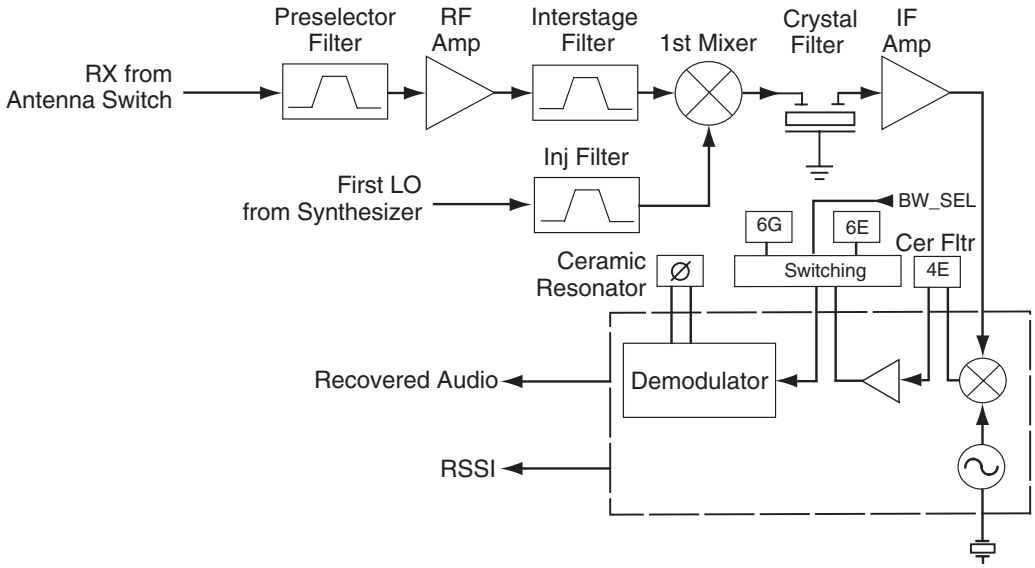


Figure 8-1. UHF Receiver Block Diagram

8.2.1 Receiver Front End

Incoming RF signals from the antenna are first routed through the harmonic filter and antenna switch, part of the transmitter circuitry, before being applied to the receiver front end. The receiver front end consists of a preselector filter, RF amplifier, an interstage filter, and a double-balanced first mixer.

The preselector filter is a fixed-tuned 3-pole Butterworth design using discrete elements (L1–L3, C1–C10, C12 and C523) in a shunt-resonator configuration. It has a 3 dB bandwidth of 68 MHz centered at 421 MHz, an insertion loss of 2.2 dB and image attenuation of 38 dB at 350 MHz. Diode CR1 protects the RF amplifier by limiting excessive RF levels. The filter bandwidth is considerably wider than the receive band, to achieve low insertion loss in a compact size. C523 provides a transmission-zero to improve image attenuation.

The output of the filter is matched to the base of RF amplifier Q21, which provides 18 dB of gain and a noise figure of 4 dB. A BFS505 device is used for high gain, low noise figure and reduced operating current. Operating voltage is obtained from the 5R source, which is turned off during transmit to reduce dissipation in Q21. Current mirror Q22 maintains the operating current of Q21 constant at 8 mA regardless of device and temperature variations, for optimum dynamic range and noise figure.

The output of the RF amplifier is applied to the interstage filter, a fixed-tuned 4-pole Butterworth shunt-coupled resonator design having a 3 dB bandwidth of 68 MHz centered at 462 MHz, and insertion loss of 3.5 dB. This filter yields an image rejection of 58 dB at 350 MHz, assisted by a transmission-zero at 300 MHz implemented by C524 for the reasons mentioned above.

The output of the interstage filter is connected to the passive double-balanced mixer consisting of components T41, T42, and CR41. This mixer has a conversion loss of 7.2 dB. Low-side injection from the frequency synthesizer is filtered by L40–L41 and C41–C45 to remove second harmonic energy that may degrade half-IF spurious rejection performance. The injection filter has a 3 dB bandwidth of 100 MHz centered at 376.15 MHz, and an insertion loss of 2.7 dB. The second-harmonic rejection is typically 45 dB or greater. The filtered injection signal is applied to T42 at a level of +6 dBm.

The mixer output is applied to a diplexer network (L51–L52, C51, R51) which matches the 44.85 MHz IF signal to crystal filter FL51, and terminates the mixer into 50Ω at all other frequencies.

8.2.2 Receiver Back End

The receiver back end is a dual conversion design. High IF selectivity is provided by FL51, a 4-pole fundamental mode 44.85 MHz crystal filter with a minimum 3 dB bandwidth of ±6.7 kHz, a maximum 20 dB bandwidth of + 12.5 kHz, and a maximum insertion loss of 3.5 dB. The output is matched to IF amplifier stage Q51 by L53 and C93. Q51 provides 16 dB of gain and a noise figure of 1.8 dB. The dc operating current is 1 mA. The output of Q51 is applied to the input of the receiver IFIC U51. Diode CR51 limits the maximum RF level applied to the IFIC.

The IFIC is a low-voltage monolithic FM IF system incorporating a mixer/oscillator, two limiting IF amplifiers, quadrature detector, logarithmic received signal strength indicator (RSSI), voltage regulator and audio and RSSI op amps. The second LO frequency, 44.395 MHz, is determined by Y51. The second mixer converts the 44.85 MHz high IF frequency to 455 kHz.

Additional IF selectivity is provided by two ceramic filters, FL52 (between the second mixer and IF amp) and FL53 or FL54 (between the IF amp and the limiter input). The wider filter FL53 is used for 20/25 kHz channel spacing, and the narrower filter FL54 is used for 12.5 kHz channels. When the BW_SEL line is high, the two upper diodes in packages D51 and D52 are forward biased, selecting FL53 for 20/25 kHz channels. When the BW_SEL line is low, the two lower diodes in packages D51 and D52 are forward biased, selecting FL54 for 12.5 kHz channels.

The ceramic filters have the following specifications:

	FL52	FL53	FL54
Number of Elements:	4	6	6
Insertion Loss:	4 dB	4 dB	4 dB
6 dB Bandwidth:	15 kHz	15 kHz	9 kHz
50 dB Bandwidth:	30 kHz	30 kHz	22 kHz
Stopband Rejection:	27 dB	47 dB	47 dB

Ceramic resonator Y70 provides phase vs. frequency characteristic required by the quadrature detector, with 90 degree phase shift occurring at 455 kHz. Buffer Q70 provides a lower driving impedance from the limiter to the resonator, improving the IF waveform and lowering the distortion of the recovered audio signal. The recovered audio level at the DEMOD output is 120 mV rms (25 kHz channel, 3 kHz deviation) or 60 mV rms (12.5 kHz channel, 1.5 kHz deviation). An additional RSSI output provides a DC voltage level that is proportional to RF signal level. This voltage is measured by an A/D converter contained in the microprocessor (PE4_AN4, U401 pin 63).

8.3 UHF Transmitter

The UHF transmitter covers the range of 403–440 MHz. Depending on model, the output power of the transmitter is either switchable on a per-channel basis between high power (4 watts) and low power (1 watt), or is factory preset to 2 watts. The transmitter is divided into four major blocks as shown in Figure 8-2.

- Power Amplifier
- Harmonic Filter
- Antenna Matching Network
- Power Control.

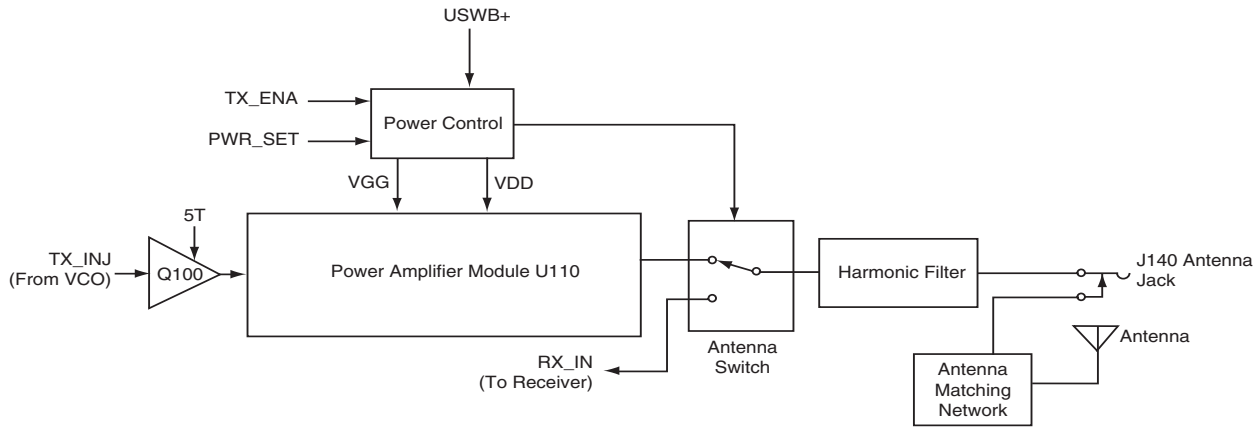


Figure 8-2. UHF Transmitter Block Diagram

8.3.1 Transmitter Power Amplifier

The transmitter power amplifier has three stages of amplification. The first stage, Q100, operates in Class A from the 5T source. It provides 17 dB of gain and an output of 50 mW. The current drain is typically 35mA. Components C105, C107 and L103 match the output of Q100 to the 50Ω input of the module U110.

U110 is a two stage Silicon MOS FET power amplifier module. Drain voltage is obtained from UNSW B+ after being routed through current-sense resistor R150 in the power control circuit. The output power of the module is controlled by varying the DC gate bias on U110 pin 2 (VGG).

8.3.2 Antenna Switch

The antenna switch consists of two pin diodes, D120 and D121. In the receive mode, both diodes are off. Signals applied at the antenna or at jack J140 are routed, via the harmonic filter, through network C122–C124 and L121, to the receiver input. In the transmit mode, Q170 is on and TXB+ is present, forward-biasing both diodes into conduction. The diode current is 20 mA, set by R120–R121. The transmitter RF from U110 is routed through D120, and via the harmonic filter to the antenna jack. D121 conducts, shunting RF power and preventing it from reaching the receiver. L121 is selected to appear as a 1/4 wave at UHF, so that the low impedance of D121 appears as a high impedance at the junction of D120 and the harmonic filter input. This provides a high series impedance and low shunt impedance divider between the power amplifier output and receiver input.

8.3.3 Harmonic Filter

The harmonic filter consists of components C122 (Range 1 UHF) C136 and L130–L132. The harmonic filter is a seven-pole Chebychev low-pass configuration, optimized for low insertion loss, with a 3 dB frequency of approximately 600 MHz and typically less than 0.8 dB insertion loss in the passband.

8.3.4 Antenna Matching Network

The harmonic filter presents a 50Ω impedance to antenna jack J140. A matching network, made up of C140–C141 and L140, is used to match the antenna impedance to the harmonic filter. This optimizes the performance of the transmitter and receiver into the impedance presented by the antenna, significantly improving the antenna's efficiency.

8.3.5 Power Control

The power control circuit is a dc-coupled amplifier whose output is the dc gate bias voltage (VGG) applied to the two stages of the RF power amplifier U110.

The output power of the transmitter is adjusted by varying the setting of the power-set DAC contained in the ASFICcmp IC (DACG, U451 pin 6). This PWR_SET voltage is applied to U150 pin 3.

Stage U150-2 compares the voltage drop across current sense resistor R150 to the voltage drop across resistor R151 caused by current flow through Q150, and adjusts its output (pin 7) to maintain equal voltages at pins 5 and 6. Thus the current flow through Q150, and hence its emitter voltage, is proportional to the current drawn by stage U110, which is in turn proportional to the transmitter output power. The emitter voltage of Q150 is applied to U150 pin 2, where it is compared to the power set voltage PWR_SET at pin 3.

The output of U150 pin 1 is divided by R110 and R111 and applied as a gate voltage to the power amplifier U110. By varying this gate voltage as needed to keep the voltages at U150 pins 2 and 3 equal, power is maintained at the desired setting. Excessive final current, for example due to antenna mismatch, causes a lowering of the voltage at U150 pin 6, an increased voltage at pin 2, and a lowering of the voltage at pin 1 and of the gate voltage VGG. This prevents damage to the final stage due to excessive current.

8.4 UHF Frequency Generation Circuitry

The frequency generation system, shown in Figure 8-3, is composed of two circuit blocks, the Fractional-N synthesizer IC U201, the VCO/Buffer IC U251, and associated circuitry. Figure 8-4 shows the peripheral interconnect and support circuitry used in the synthesizer block, and Figure 8-5 details the internal circuitry of the VCOBIC and its interconnections to the surrounding components. Refer to the schematic to identify reference designators.

The Fractional-N synthesizer is powered by regulated 5 V and 3 V provided by U310 and U330 respectively. 5 V is applied to U201 pins 13 and 30, and 3 V is applied to pins 5, 20, 34 and 36. The synthesizer in turn generates a super-filtered 4.5 V supply (VSF, from pin 28) to power U251. In addition to the VCO, the synthesizer also interfaces with the logic and ASFICcmp circuits. Programming for the synthesizer is accomplished through the microprocessor SPI_DATA_OUT,

SPI_CLK, and SYNTH_CS (chip select) lines (U409 pins 100, 1 and 47 respectively). A logic high (3 V) from U201 pin 4 indicates to the microprocessor that the synthesizer is locked.

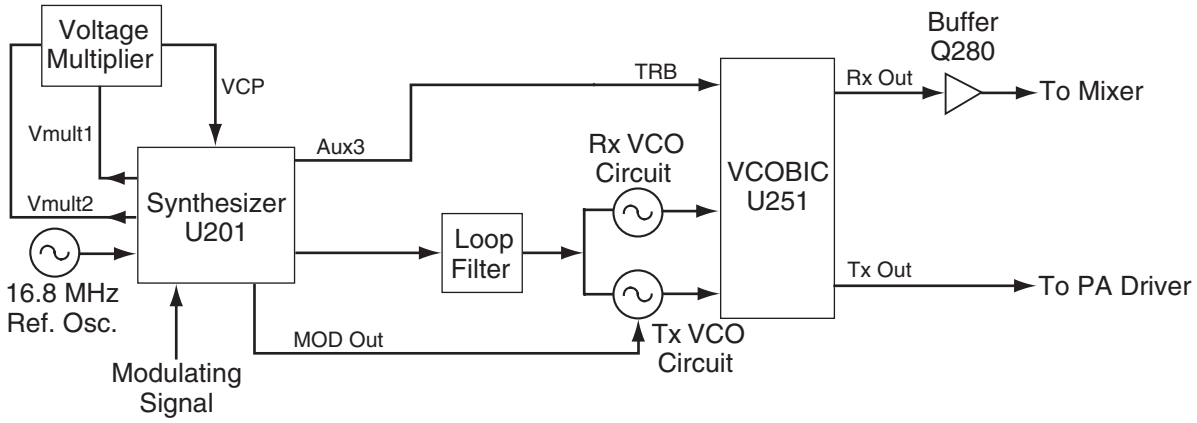


Figure 8-3. UHF Frequency Generation Unit Block Diagram

Transmit modulation from the ASFICcmp (U451 pin 40) is applied to U201 pin 10 (MOD_IN). An electronic attenuator in the ASFICcmp adjusts overall transmitter deviation by varying the audio level applied to the synthesizer IC. Internally the audio is digitized by the Fractional-N synthesizer and applied to the loop divider to provide the low-port modulation. The audio is also routed through an internal attenuator for the purpose of balancing the low port and high port modulation and reducing the deviation by 6 dB for 12.5 kHz channels, and is available at U201 pin 41 (VCO_MOD). This audio signal is routed to the VCO's modulator.

8.4.1 Fractional-N Synthesizer

The Fractional-N synthesizer, shown in Figure 8-4, uses a 16.8 MHz crystal (Y201) to provide the reference frequency for the system. External components C201–C203, R202 and D201 are also part of the temperature-compensated oscillator circuit. The dc voltage applied to varactor D201 from U201 pin 25 is determined by a temperature-compensation algorithm within U201, and is specific to each crystal Y201, based on a unique code assigned to the crystal that identifies its temperature characteristics. Stability is better than 2.5 ppm over temperatures of -30 to 60°C. Software-programmable electronic frequency adjustment is achieved by an internal DAC which provides a frequency adjustment voltage from U201 pin 25 to varactor D201.

The synthesizer IC U201 further divides the 16.8 MHz signal to 2.1 MHz, 2.225 MHz, or 2.4 MHz for use as reference frequencies. It also provides a buffered 16.8 MHz signal at U201 pin 19 for use by the ASFICcmp.

To achieve fast locking of the synthesizer, an internal adapt charge pump provides higher current at U201 pin 45 to quickly force the synthesizer within lock range. The required frequency is then locked by the normal mode charge pump at pin 43. A loop filter (C243–C245 and R243–R245) removes noise and spurs from the steering voltage applied to the VCO varactors, with additional filtering located in the VCO circuit.

Both the normal and adapt charge pumps get their supply from the capacitive voltage multiplier made up of C221–C224 and D220–D221. Two 3 V square waves from U201 pins 14–15 provide the drive signals for the voltage multiplier, which generates 12.1 V at U201 pin 47. This voltage is filtered by C225–C228.

One of the auxiliary outputs of the synthesizer IC (AUX3, U201 pin 2) provides the TRB signal which determines the operating mode of the VCO, either receive or transmit.

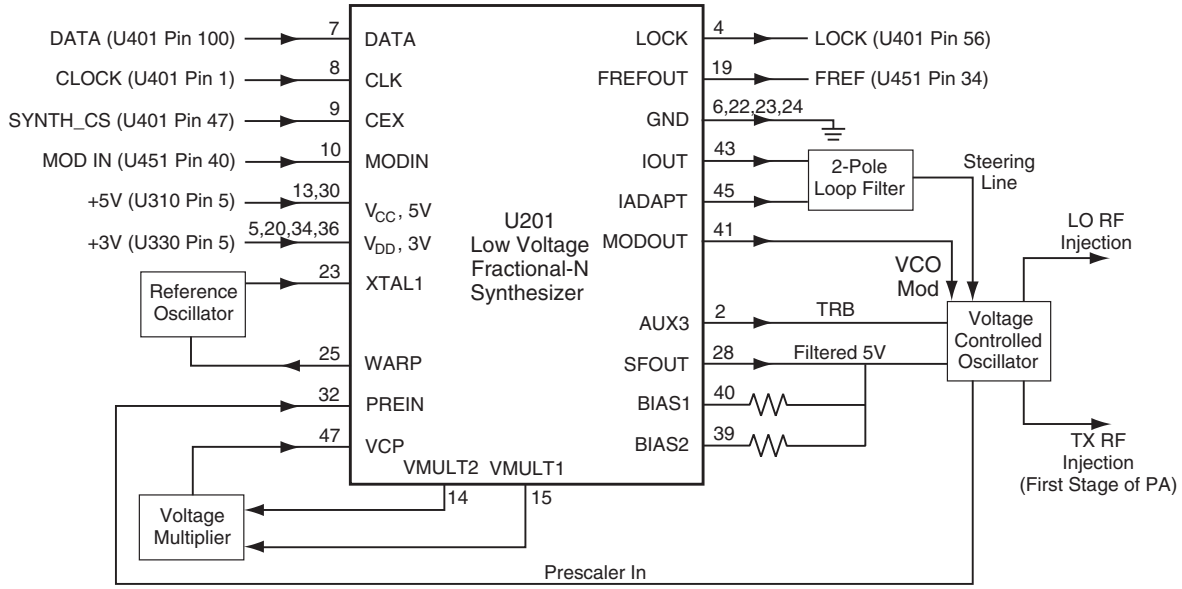


Figure 8-4. UHF Synthesizer Block Diagram

8.4.2 Voltage Controlled Oscillator (VCO)

The VCOBIC (U251), shown in Figure 8-5, in conjunction with the Fractional-N synthesizer (U201) generates RF in both the receive and the transmit modes of operation. The TRB line (U251 pin 19) determines which oscillator and buffer are enabled. A sample of the RF signal from the enabled oscillator is routed from U251 pin 12 through a low pass filter, to the prescaler input of the synthesizer IC (U201 pin 32). After frequency comparison in the synthesizer, a resultant DC control voltage is used to steer the VCO frequency. When the PLL is locked on frequency, this voltage can vary between 3.5 V and 10 V. L251 and C252 further attenuate noise and spurs on the steering line voltage.

In the receive mode, the TRB line (U251 pin 19) is low. This activates the receive VCO and the receive buffer of U251, which operate within the range of 358.15 to 395.15 MHz. The VCO frequency is determined by tank inductor L254, C253–C257, and varactor D251. The buffered RF signal at U251 pin 8 is further amplified by Q280 and applied as RX_INJ to the low-pass injection filter in the receiver front end circuit.

In the transmit mode, U251-19 is driven high by U201 pin 2, enabling the transmit VCO and buffer. The 403–470 MHz RF signal from U251 pin 10 is applied as TX_INJ to the input of the transmitter circuit via matching network C290–C291 and L291. TX VCO frequency is determined by L264,

C263–C267, and varactor D261. High-port audio modulation from the synthesizer IC is applied as VCO_MOD to varactor D262 which modulates the transmit VCO.

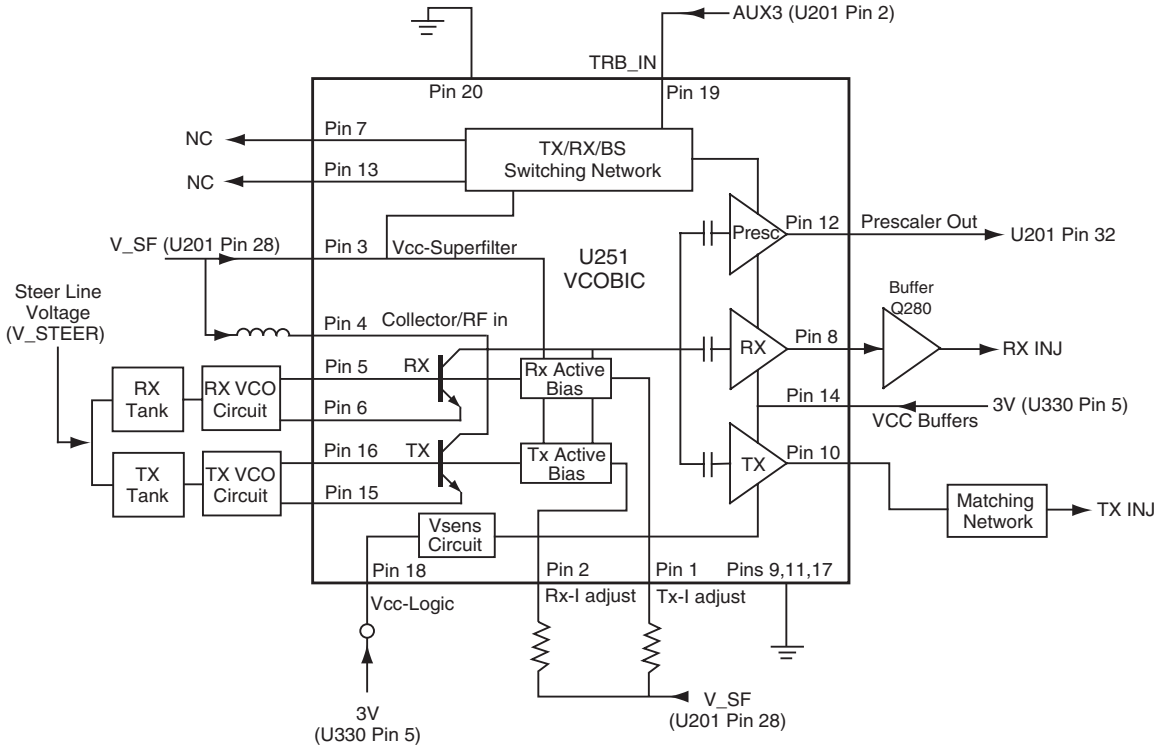


Figure 8-5. UHF VCO Block Diagram

Notes

Chapter 9 438–470 MHz UHF Theory Of Operation

9.1 Introduction

This chapter provides a detailed theory of operation for the radio components. Schematic diagrams for the circuits described in the following paragraphs are located in Chapter 13 of this manual.

9.2 UHF Receiver

The UHF receiver covers the range of 438–470 MHz and provides switchable IF bandwidth for use with 20/25/30 kHz or 12.5 kHz channel spacing systems. The receiver is divided into two major blocks, as shown in Figure 9-1.

- Front End
- Back End

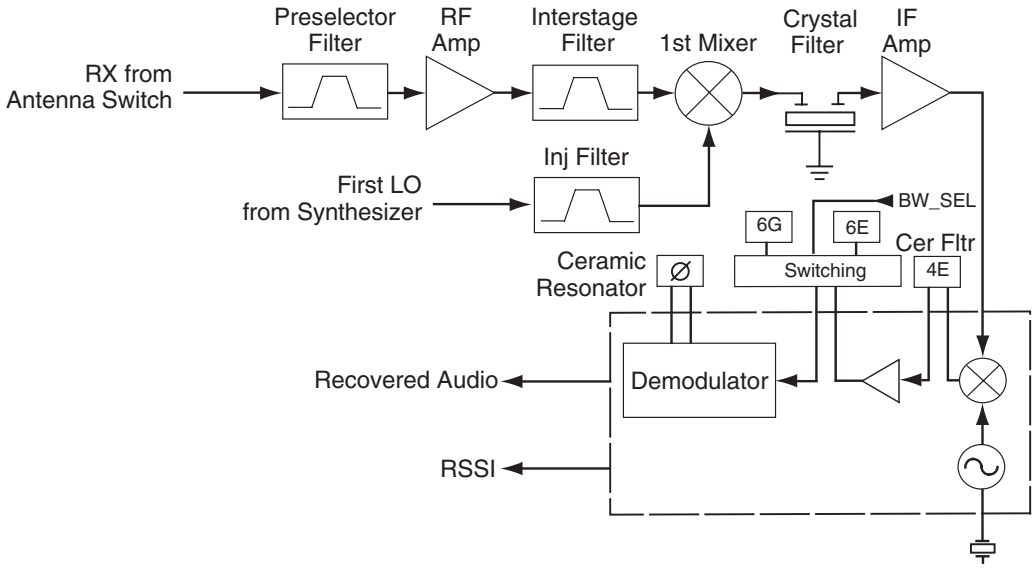


Figure 9-1. UHF Receiver Block Diagram

9.2.1 Receiver Front End

Incoming RF signals from the antenna are first routed through the harmonic filter and antenna switch, part of the transmitter circuitry, before being applied to the receiver front end. The receiver front end consists of a preselector filter, RF amplifier, an interstage filter, and a double-balanced first mixer.

The preselector filter is a fixed-tuned 3-pole Butterworth design using discrete elements (L1–L3, C1–C10, C12 and C523) in a shunt-resonator configuration. It has a 3 dB bandwidth of 68 MHz centered at 460 MHz, an insertion loss of 2 dB and image attenuation of 35 dB at 380 MHz. Diode CR1 protects the RF amplifier by limiting excessive RF levels. The filter bandwidth is considerably wider than the receive band, to achieve low insertion loss in a compact size. C523 provides a transmission-zero to improve image attenuation.

The output of the filter is matched to the base of RF amplifier Q21, which provides 18 dB of gain and a noise figure of 4 dB. A BFS505 device is used for high gain, low noise figure and reduced operating current. Operating voltage is obtained from the 5R source, which is turned off during transmit to reduce dissipation in Q21. Current mirror Q22 maintains the operating current of Q21 constant at 8 mA regardless of device and temperature variations, for optimum dynamic range and noise figure.

The output of the RF amplifier is applied to the interstage filter, a fixed-tuned 4-pole Butterworth shunt-coupled resonator design having a 3 dB bandwidth of 68 MHz centered at 462 MHz, and insertion loss of 3 dB. This filter yields an image rejection of 48 dB at 380 MHz, assisted by a transmission-zero at 300 MHz implemented by C524 for the reasons mentioned above.

The output of the interstage filter is connected to the passive double-balanced mixer consisting of components T41, T42, and CR41. This mixer has a conversion loss of 7.2 dB. Low-side injection from the frequency synthesizer is filtered by L40–L41 and C41–C45 to remove second harmonic energy that may degrade half-IF spurious rejection performance. The injection filter has a 3 dB bandwidth of 100 MHz centered at 408 MHz, and an insertion loss of 2 dB. The second-harmonic rejection is typically 40 dB or greater. The filtered injection signal is applied to T42 at a level of +6 dBm.

The mixer output is applied to a diplexer network (L51–L52, C51, R51) which matches the 44.85 MHz IF signal to crystal filter FL51, and terminates the mixer into 50Ω at all other frequencies.

9.2.2 Receiver Back End

The receiver back end is a dual conversion design. High IF selectivity is provided by FL51, a 4-pole fundamental mode 44.85 MHz crystal filter with a minimum 3 dB bandwidth of ±6.7 kHz, a maximum 20 dB bandwidth of + 12.5 kHz, and a maximum insertion loss of 3.5 dB. The output is matched to IF amplifier stage Q51 by L53 and C93. Q51 provides 16 dB of gain and a noise figure of 1.8 dB. The dc operating current is 1 mA. The output of Q51 is applied to the input of the receiver IFIC U51. Diode CR51 limits the maximum RF level applied to the IFIC.

The IFIC is a low-voltage monolithic FM IF system incorporating a mixer/oscillator, two limiting IF amplifiers, quadrature detector, logarithmic received signal strength indicator (RSSI), voltage regulator and audio and RSSI op amps. The second LO frequency, 44.395 MHz, is determined by Y51. The second mixer converts the 44.85 MHz high IF frequency to 455 kHz.

Additional IF selectivity is provided by two ceramic filters, FL52 (between the second mixer and IF amp) and FL53 or FL54 (between the IF amp and the limiter input). The wider filter FL53 is used for 20/25 kHz channel spacing, and the narrower filter FL54 is used for 12.5 kHz channels. When the BW_SEL line is high, the two upper diodes in packages D51 and D52 are forward biased, selecting FL53 for 20/25 kHz channels. When the BW_SEL line is low, the two lower diodes in packages D51 and D52 are forward biased, selecting FL54 for 12.5 kHz channels.

The ceramic filters have the following specifications:

	FL52	FL53	FL54
Number of Elements:	4	6	6
Insertion Loss:	4 dB	4 dB	4 dB
6 dB Bandwidth:	15 kHz	15 kHz	9 kHz
50 dB Bandwidth:	30 kHz	30 kHz	22 kHz
Stopband Rejection:	27 dB	47 dB	47 dB

Ceramic resonator Y70 provides phase vs. frequency characteristic required by the quadrature detector, with 90 degree phase shift occurring at 455 kHz. Buffer Q70 provides a lower driving impedance from the limiter to the resonator, improving the IF waveform and lowering the distortion of the recovered audio signal. The recovered audio level at the DEMOD output is 120 mV rms (25 kHz channel, 3 kHz deviation) or 60 mV rms (12.5 kHz channel, 1.5 kHz deviation). An additional RSSI output provides a DC voltage level that is proportional to RF signal level. This voltage is measured by an A/D converter contained in the microprocessor (PE4_AN4, U401 pin 63).

9.3 UHF Transmitter

The UHF transmitter covers the range of 438–470 MHz. Depending on model, the output power of the transmitter is either switchable on a per-channel basis between high power (4 watts) and low power (1 watt), or is factory preset to 2 watts. The transmitter is divided into four major blocks as shown in Figure 9-2.

- Power Amplifier
- Harmonic Filter
- Antenna Matching Network
- Power Control.

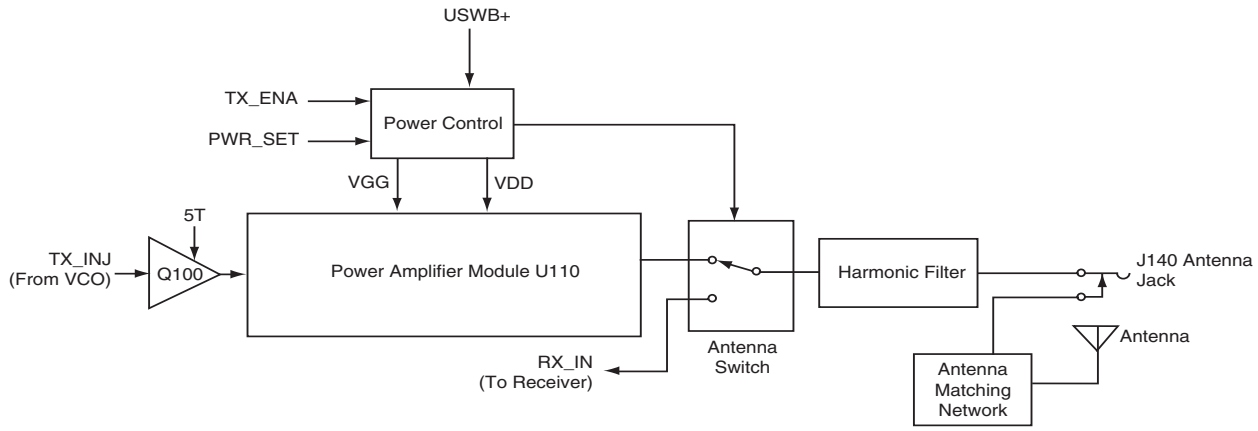


Figure 9-2. UHF Transmitter Block Diagram

9.3.1 Transmitter Power Amplifier

The transmitter power amplifier has three stages of amplification. The first stage, Q100, operates in Class A from the 5T source. It provides 17 dB of gain and an output of 50 mW. The current drain is typically 30mA. Components C105 and L103 match the output of Q100 to the 50Ω input of the module U110.

U110 is a two stage Silicon MOS FET power amplifier module. Drain voltage is obtained from UNSW B+ after being routed through current-sense resistor R150 in the power control circuit. The output power of the module is controlled by varying the DC gate bias on U110 pin 2 (VGG).

9.3.2 Antenna Switch

The antenna switch consists of two pin diodes, D120 and D121. In the receive mode, both diodes are off. Signals applied at the antenna or at jack J140 are routed, via the harmonic filter, through network C122–C124 and L121, to the receiver input. In the transmit mode, Q170 is on and TXB+ is present, forward-biasing both diodes into conduction. The diode current is 20 mA, set by R120–R121. The transmitter RF from U110 is routed through D120, and via the harmonic filter to the antenna jack. D121 conducts, shunting RF power and preventing it from reaching the receiver. L121 is selected to appear as a 1/4 wave at UHF, so that the low impedance of D121 appears as a high impedance at the junction of D120 and the harmonic filter input. This provides a high series impedance and low shunt impedance divider between the power amplifier output and receiver input.

9.3.3 Harmonic Filter

The harmonic filter consists of components C130–C136 and L130–L132. The harmonic filter is a seven-pole Chebychev low-pass configuration, optimized for low insertion loss, with a 3 dB frequency of approximately 600 MHz and typically less than 0.8 dB insertion loss in the passband.

9.3.4 Antenna Matching Network

The harmonic filter presents a 50Ω impedance to antenna jack J140. A matching network, made up of C140–C141 and L140, is used to match the antenna impedance to the harmonic filter. This optimizes the performance of the transmitter and receiver into the impedance presented by the antenna, significantly improving the antenna's efficiency.

9.3.5 Power Control

The power control circuit is a dc-coupled amplifier whose output is the dc gate bias voltage (VGG) applied to the two stages of the RF power amplifier U110.

The output power of the transmitter is adjusted by varying the setting of the power-set DAC contained in the ASFICcmp IC (DACG, U451 pin 6). This PWR_SET voltage is applied to U150 pin 3.

Stage U150-2 compares the voltage drop across current sense resistor R150 to the voltage drop across resistor R151 caused by current flow through Q150, and adjusts its output (pin 7) to maintain equal voltages at pins 5 and 6. Thus the current flow through Q150, and hence its emitter voltage, is proportional to the current drawn by stage U110, which is in turn proportional to the transmitter output power. The emitter voltage of Q150 is applied to U150 pin 2, where it is compared to the power set voltage PWR_SET at pin 3.

The output of U150 pin 1 is divided by R110 and R111 and applied as a gate voltage to the power amplifier U110. By varying this gate voltage as needed to keep the voltages at U150 pins 2 and 3 equal, power is maintained at the desired setting. Excessive final current, for example due to antenna mismatch, causes a lowering of the voltage at U150 pin 6, an increased voltage at pin 2, and a lowering of the voltage at pin 1 and of the gate voltage VGG. This prevents damage to the final stage due to excessive current.

9.4 UHF Frequency Generation Circuitry

The frequency generation system, shown in Figure 9-3, is composed of two circuit blocks, the Fractional-N synthesizer IC U201, the VCO/Buffer IC U251, and associated circuitry. Figure 9-4 shows the peripheral interconnect and support circuitry used in the synthesizer block, and Figure 9-5 details the internal circuitry of the VCOBIC and its interconnections to the surrounding components. Refer to the schematic to identify reference designators.

The Fractional-N synthesizer is powered by regulated 5 V and 3 V provided by U310 and U330 respectively. 5 V is applied to U201 pins 13 and 30, and 3 V is applied to pins 5, 20, 34 and 36. The synthesizer in turn generates a super-filtered 4.5 V supply (VSF, from pin 28) to power U251. In addition to the VCO, the synthesizer also interfaces with the logic and ASFICcmp circuits. Programming for the synthesizer is accomplished through the microprocessor SPI_DATA_OUT,

SPI_CLK, and SYNTH_CS (chip select) lines (U409 pins 100, 1 and 47 respectively). A logic high (3 V) from U201 pin 4 indicates to the microprocessor that the synthesizer is locked.

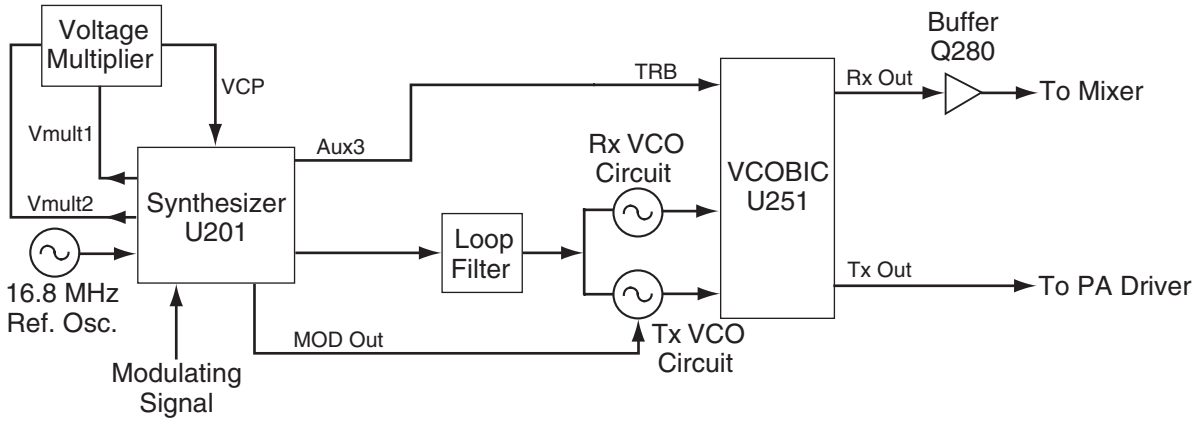


Figure 9-3. UHF Frequency Generation Unit Block Diagram

Transmit modulation from the ASFICcmp (U451 pin 40) is applied to U201 pin 10 (MOD_IN). An electronic attenuator in the ASFICcmp adjusts overall transmitter deviation by varying the audio level applied to the synthesizer IC. Internally the audio is digitized by the Fractional-N synthesizer and applied to the loop divider to provide the low-port modulation. The audio is also routed through an internal attenuator for the purpose of balancing the low port and high port modulation and reducing the deviation by 6 dB for 12.5 kHz channels, and is available at U201 pin 41 (VCO_MOD). This audio signal is routed to the VCO's modulator.

9.4.1 Fractional-N Synthesizer

The Fractional-N synthesizer, shown in Figure 9-4, uses a 16.8 MHz crystal (Y201) to provide the reference frequency for the system. External components C201–C203, R202 and D201 are also part of the temperature-compensated oscillator circuit. The dc voltage applied to varactor D201 from U201 pin 25 is determined by a temperature-compensation algorithm within U201, and is specific to each crystal Y201, based on a unique code assigned to the crystal that identifies its temperature characteristics. Stability is better than 2.5 ppm over temperatures of -30 to 60°C. Software-programmable electronic frequency adjustment is achieved by an internal DAC which provides a frequency adjustment voltage from U201 pin 25 to varactor D201.

The synthesizer IC U201 further divides the 16.8 MHz signal to 2.1 MHz, 2.225 MHz, or 2.4 MHz for use as reference frequencies. It also provides a buffered 16.8 MHz signal at U201 pin 19 for use by the ASFICcmp.

To achieve fast locking of the synthesizer, an internal adapt charge pump provides higher current at U201 pin 45 to quickly force the synthesizer within lock range. The required frequency is then locked by the normal mode charge pump at pin 43. A loop filter (C243–C245 and R243–R245) removes noise and spurs from the steering voltage applied to the VCO varactors, with additional filtering located in the VCO circuit.

Both the normal and adapt charge pumps get their supply from the capacitive voltage multiplier made up of C221–C224 and D220–D221. Two 3 V square waves from U201 pins 14–15 provide the drive signals for the voltage multiplier, which generates 12.1 V at U201 pin 47. This voltage is filtered by C225–C228.

One of the auxiliary outputs of the synthesizer IC (AUX3, U201 pin 2) provides the TRB signal which determines the operating mode of the VCO, either receive or transmit.

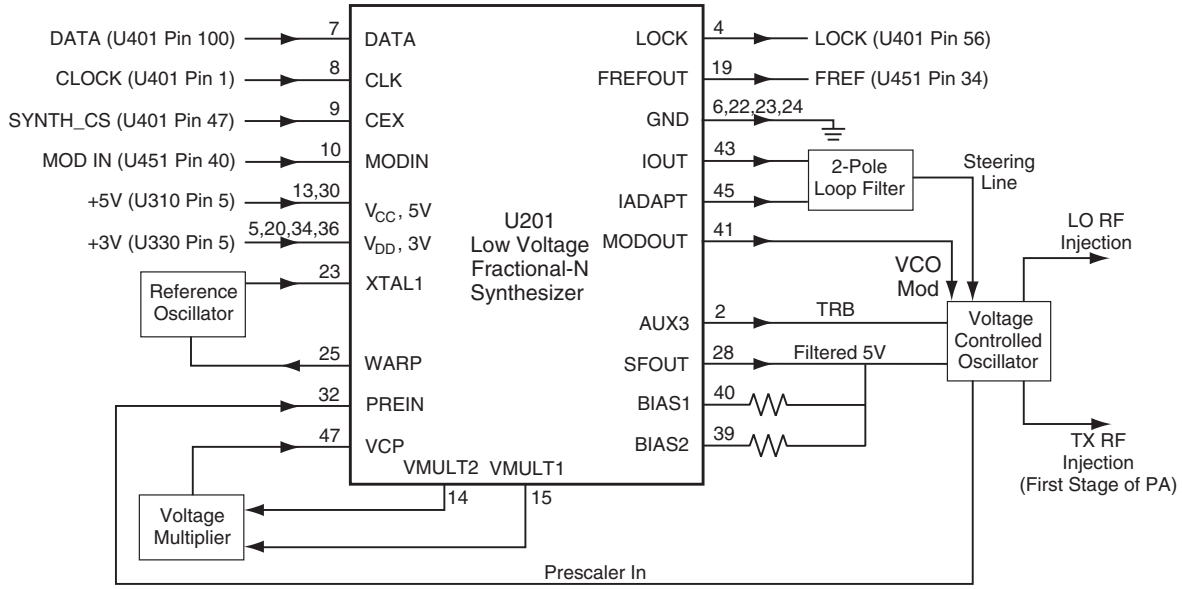


Figure 9-4. UHF Synthesizer Block Diagram

9.4.2 Voltage Controlled Oscillator (VCO)

The VCOBIC (U251), shown in Figure 9-5, in conjunction with the Fractional-N synthesizer (U201) generates RF in both the receive and the transmit modes of operation. The TRB line (U251 pin 19) determines which oscillator and buffer are enabled. A sample of the RF signal from the enabled oscillator is routed from U251 pin 12 through a low pass filter, to the prescaler input of the synthesizer IC (U201 pin 32). After frequency comparison in the synthesizer, a resultant DC control voltage is used to steer the VCO frequency. When the PLL is locked on frequency, this voltage can vary between 3.5 V and 10 V. L251 and C252 further attenuate noise and spurs on the steering line voltage.

In the receive mode, the TRB line (U251 pin 19) is low. This activates the receive VCO and the receive buffer of U251, which operate within the range of 393.15 to 425.15 MHz. The VCO frequency is determined by tank inductor L254, C253–C257, and varactor D251. The buffered RF signal at U251 pin 8 is further amplified by Q280 and applied as RX_INJ to the low-pass injection filter in the receiver front end circuit.

In the transmit mode, U251-19 is driven high by U201 pin 2, enabling the transmit VCO and buffer. The 438–470 MHz RF signal from U251 pin 10 is applied as TX_INJ to the input of the transmitter circuit via matching network C290–C291 and L291. TX VCO frequency is determined by L264,

C263–C267, and varactor D261. High-port audio modulation from the synthesizer IC is applied as VCO_MOD to varactor D262 which modulates the transmit VCO.

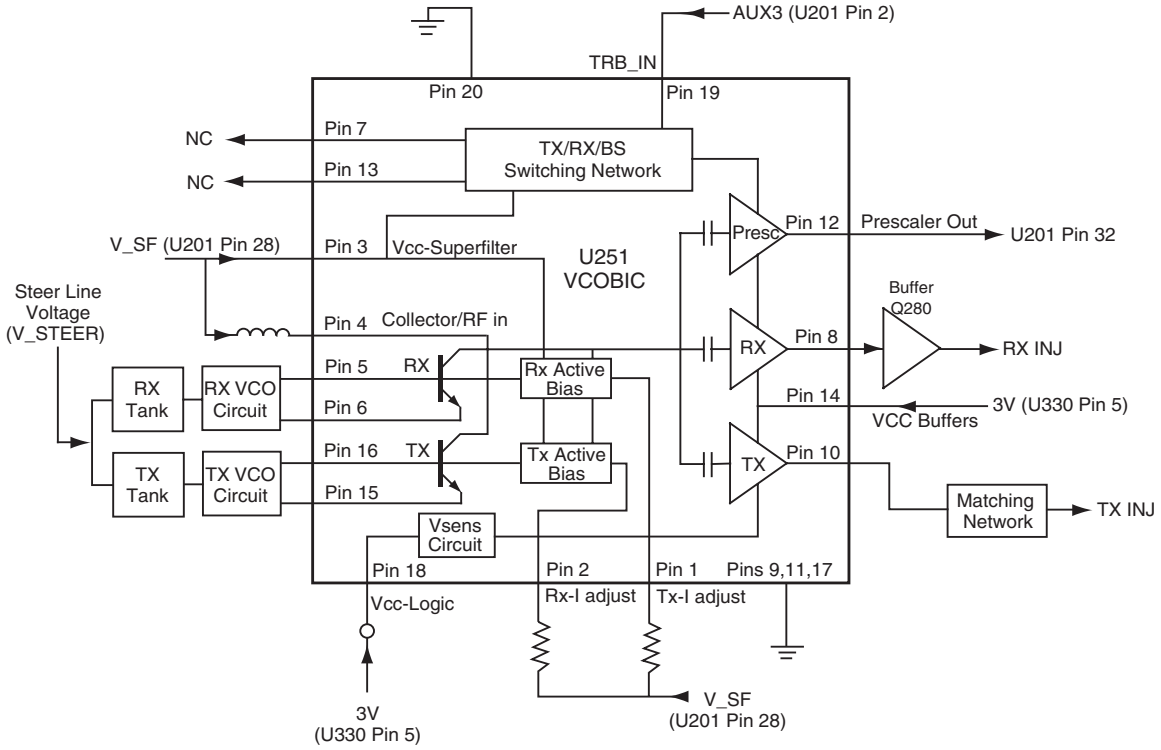


Figure 9-5. UHF VCO Block Diagram

Notes

Chapter 10 465–495 MHz UHF Theory Of Operation

10.1 Introduction

This chapter provides a detailed theory of operation for the radio components. Schematic diagrams for the circuits described in the following paragraphs are located in Chapter 13 of this manual.

10.2 UHF Receiver

The UHF receiver covers the range of 465–495 MHz and provides switchable IF bandwidth for use with 20/25/30 kHz or 12.5 kHz channel spacing systems. The receiver is divided into two major blocks, as shown in Figure 10-1.

- Front End
- Back End

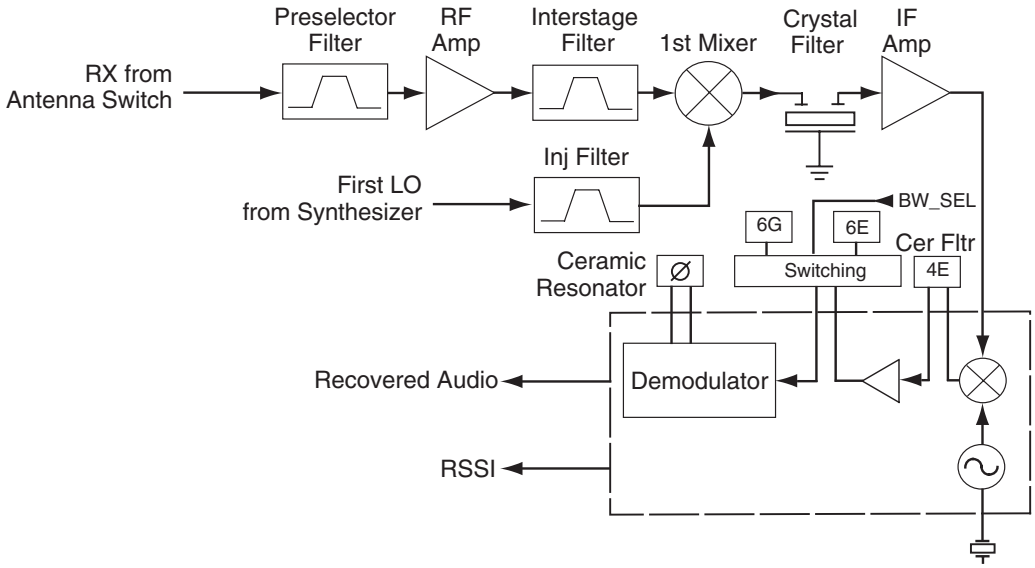


Figure 10-1. UHF Receiver Block Diagram

10.2.1 Receiver Front End

Incoming RF signals from the antenna are first routed through the harmonic filter and antenna switch, part of the transmitter circuitry, before being applied to the receiver front end. The receiver front end consists of a preselector filter, RF amplifier, an interstage filter, and a double-balanced first mixer.

The preselector filter is a fixed-tuned 3-pole Butterworth design using discrete elements (L1–L3, C1–C10, C12 and C523) in a shunt-resonator configuration. It has a 3 dB bandwidth of 68 MHz centered at 480 MHz, an insertion loss of 2 dB and image attenuation of 39 dB at 405.3 MHz. Diode CR1 protects the RF amplifier by limiting excessive RF levels. The filter bandwidth is considerably wider than the receive band, to achieve low insertion loss in a compact size. C523 provides a transmission-zero to improve image attenuation.

The output of the filter is matched to the base of RF amplifier Q21, which provides 18 dB of gain and a noise figure of 3.3 dB. A BFS505 device is used for high gain, low noise figure and reduced operating current. Operating voltage is obtained from the 5R source, which is turned off during transmit to reduce dissipation in Q21. Current mirror Q22 maintains the operating current of Q21 constant at 8 mA regardless of device and temperature variations, for optimum dynamic range and noise figure.

The output of the RF amplifier is applied to the interstage filter, a fixed-tuned 4-pole Butterworth shunt-coupled resonator design having a 3 dB bandwidth of 68 MHz centered at 480 MHz, and insertion loss of 3.3 dB. This filter yields an image rejection of 55 dB at 405.3 MHz, assisted by a transmission-zero at 300 MHz implemented by C524 for the reasons mentioned above.

The output of the interstage filter is connected to the passive double-balanced mixer consisting of components T41, T42, and CR41. This mixer has a conversion loss of 7.2 dB. Low-side injection from the frequency synthesizer is filtered by L40–L41 and C41–C45 to remove second harmonic energy that may degrade half-IF spurious rejection performance. The injection filter has a 3 dB bandwidth of 100 MHz centered at 408 MHz, and an insertion loss of 2.5 dB. The second-harmonic rejection is typically 40 dB or greater. The filtered injection signal is applied to T42 at a level of +6 dBm.

The mixer output is applied to a diplexer network (L51–L52, C51, R51) which matches the 44.85 MHz IF signal to crystal filter FL51, and terminates the mixer into 50Ω at all other frequencies.

10.2.2 Receiver Back End

The receiver back end is a dual conversion design. High IF selectivity is provided by FL51, a 4-pole fundamental mode 44.85 MHz crystal filter with a minimum 3 dB bandwidth of ±6.7 kHz, a maximum 20 dB bandwidth of + 12.5 kHz, and a maximum insertion loss of 3.5 dB. The output is matched to IF amplifier stage Q51 by L53 and C93. Q51 provides 16 dB of gain and a noise figure of 1.8 dB. The dc operating current is 1 mA. The output of Q51 is applied to the input of the receiver IFIC U51. Diode CR51 limits the maximum RF level applied to the IFIC.

The IFIC is a low-voltage monolithic FM IF system incorporating a mixer/oscillator, two limiting IF amplifiers, quadrature detector, logarithmic received signal strength indicator (RSSI), voltage regulator and audio and RSSI op amps. The second LO frequency, 44.395 MHz, is determined by Y51. The second mixer converts the 44.85 MHz high IF frequency to 455 kHz.

Additional IF selectivity is provided by two ceramic filters, FL52 (between the second mixer and IF amp) and FL53 or FL54 (between the IF amp and the limiter input). The wider filter FL53 is used for 20/25 kHz channel spacing, and the narrower filter FL54 is used for 12.5 kHz channels. When the BW_SEL line is high, the two upper diodes in packages D51 and D52 are forward biased, selecting FL53 for 20/25 kHz channels. When the BW_SEL line is low, the two lower diodes in packages D51 and D52 are forward biased, selecting FL54 for 12.5 kHz channels.

The ceramic filters have the following specifications:

	FL52	FL53	FL54
Number of Elements:	4	6	6
Insertion Loss:	4 dB	4 dB	4 dB
6 dB Bandwidth:	15 kHz	15 kHz	9 kHz
50 dB Bandwidth:	30 kHz	30 kHz	22 kHz
Stopband Rejection:	27 dB	47 dB	47 dB

Ceramic resonator Y70 provides phase vs. frequency characteristic required by the quadrature detector, with 90 degree phase shift occurring at 455 kHz. Buffer Q70 provides a lower driving impedance from the limiter to the resonator, improving the IF waveform and lowering the distortion of the recovered audio signal. The recovered audio level at the DEMOD output is 120 mV rms (25 kHz channel, 3 kHz deviation) or 60 mV rms (12.5 kHz channel, 1.5 kHz deviation). An additional RSSI output provides a DC voltage level that is proportional to RF signal level. This voltage is measured by an A/D converter contained in the microprocessor (PE4_AN4, U401 pin 63).

10.3 UHF Transmitter

The UHF transmitter covers the range of 465–495 MHz. Depending on model, the output power of the transmitter is either switchable on a per-channel basis between high power (4 watts) and low power (1 watt), or is factory preset to 2 watts. The transmitter is divided into four major blocks as shown in Figure 10-2.

- Power Amplifier
- Harmonic Filter
- Antenna Matching Network
- Power Control.

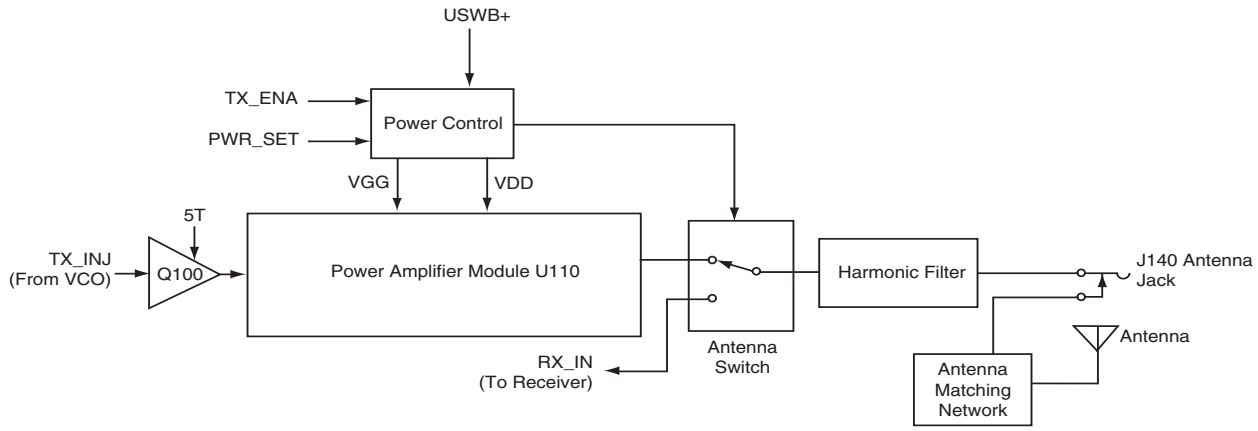


Figure 10-2. UHF Transmitter Block Diagram

10.3.1 Transmitter Power Amplifier

The transmitter power amplifier has three stages of amplification. The first stage, Q100, operates in Class A from the 5T source. It provides 17 dB of gain and an output of 50 mW. The current drain is typically 30mA. Components C105 and L103 match the output of Q100 to the 50Ω input of the module U110.

U110 is a two stage Silicon MOS FET power amplifier module. Drain voltage is obtained from UNSW B+ after being routed through current-sense resistor R150 in the power control circuit. The output power of the module is controlled by varying the DC gate bias on U110 pin 2 (VGG).

10.3.2 Antenna Switch

The antenna switch consists of two pin diodes, D120 and D121. In the receive mode, both diodes are off. Signals applied at the antenna or at jack J140 are routed, via the harmonic filter, through network C122–C124 and L121, to the receiver input. In the transmit mode, Q170 is on and TXB+ is present, forward-biasing both diodes into conduction. The diode current is 20 mA, set by R120–R121. The transmitter RF from U110 is routed through D120, and via the harmonic filter to the antenna jack. D121 conducts, shunting RF power and preventing it from reaching the receiver. L121 is selected to appear as a 1/4 wave at UHF, so that the low impedance of D121 appears as a high impedance at the junction of D120 and the harmonic filter input. This provides a high series impedance and low shunt impedance divider between the power amplifier output and receiver input.

10.3.3 Harmonic Filter

The harmonic filter consists of components C130–C136 and L130–L132. The harmonic filter is a seven-pole Chebychev low-pass configuration, optimized for low insertion loss, with a 3 dB frequency of approximately 655 MHz and typically less than 0.8 dB insertion loss in the passband.

10.3.4 Antenna Matching Network

The harmonic filter presents a 50Ω impedance to antenna jack J140. A matching network, made up of C140–C141 and L140, is used to match the antenna impedance to the harmonic filter. This optimizes the performance of the transmitter and receiver into the impedance presented by the antenna, significantly improving the antenna's efficiency.

10.3.5 Power Control

The power control circuit is a dc-coupled amplifier whose output is the dc gate bias voltage (VGG) applied to the two stages of the RF power amplifier U110.

The output power of the transmitter is adjusted by varying the setting of the power-set DAC contained in the ASFICcmp IC (DACG, U451 pin 6). This PWR_SET voltage is applied to U150 pin 3.

Stage U150-2 compares the voltage drop across current sense resistor R150 to the voltage drop across resistor R151 caused by current flow through Q150, and adjusts its output (pin 7) to maintain equal voltages at pins 5 and 6. Thus the current flow through Q150, and hence its emitter voltage, is proportional to the current drawn by stage U110, which is in turn proportional to the transmitter output power. The emitter voltage of Q150 is applied to U150 pin 2, where it is compared to the power set voltage PWR_SET at pin 3.

The output of U150 pin 1 is divided by R110 and R111 and applied as a gate voltage to the power amplifier U110. By varying this gate voltage as needed to keep the voltages at U150 pins 2 and 3 equal, power is maintained at the desired setting. Excessive final current, for example due to antenna mismatch, causes a lowering of the voltage at U150 pin 6, an increased voltage at pin 2, and a lowering of the voltage at pin 1 and of the gate voltage VGG. This prevents damage to the final stage due to excessive current.

10.4 UHF Frequency Generation Circuitry

The frequency generation system, shown in Figure 10-3, is composed of two circuit blocks, the Fractional-N synthesizer IC U201, the VCO/Buffer IC U251, and associated circuitry. Figure 10-4 shows the peripheral interconnect and support circuitry used in the synthesizer block, and Figure 10-5 details the internal circuitry of the VCOBIC and its interconnections to the surrounding components. Refer to the schematic to identify reference designators.

The Fractional-N synthesizer is powered by regulated 5 V and 3 V provided by U310 and U330 respectively. 5 V is applied to U201 pins 13 and 30, and 3 V is applied to pins 5, 20, 34 and 36. The synthesizer in turn generates a super-filtered 4.5 V supply (VSF, from pin 28) to power U251. In addition to the VCO, the synthesizer also interfaces with the logic and ASFICcmp circuits. Programming for the synthesizer is accomplished through the microprocessor SPI_DATA_OUT,

SPI_CLK, and SYNTH_CS (chip select) lines (U409 pins 100, 1 and 47 respectively). A logic high (3 V) from U201 pin 4 indicates to the microprocessor that the synthesizer is locked.

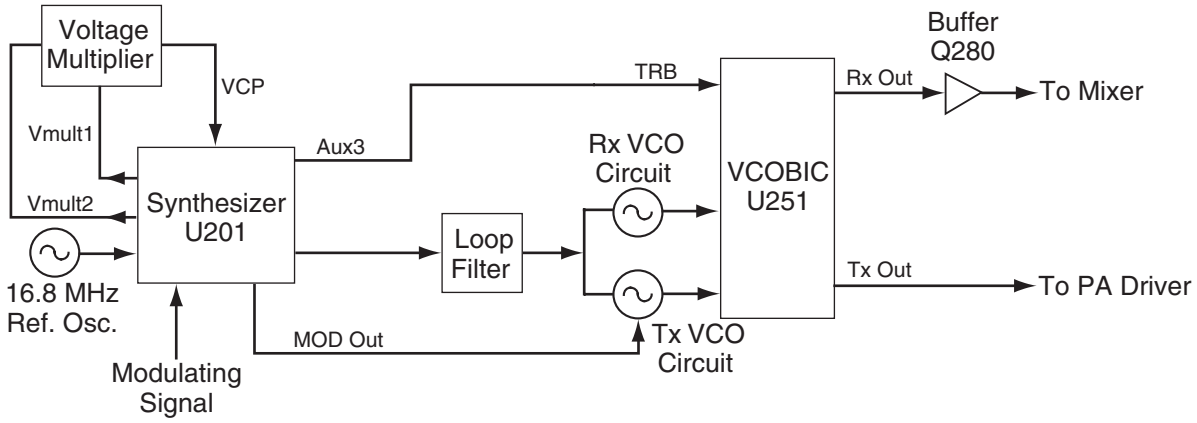


Figure 10-3. UHF Frequency Generation Unit Block Diagram

Transmit modulation from the ASFICcmp (U451 pin 40) is applied to U201 pin 10 (MOD_IN). An electronic attenuator in the ASFICcmp adjusts overall transmitter deviation by varying the audio level applied to the synthesizer IC. Internally the audio is digitized by the Fractional-N synthesizer and applied to the loop divider to provide the low-port modulation. The audio is also routed through an internal attenuator for the purpose of balancing the low port and high port modulation and reducing the deviation by 6 dB for 12.5 kHz channels, and is available at U201 pin 41 (VCO_MOD). This audio signal is routed to the VCO's modulator.

10.4.1 Fractional-N Synthesizer

The Fractional-N synthesizer, shown in Figure 10-4, uses a 16.8 MHz crystal (Y201) to provide the reference frequency for the system. External components C201–C203, R202 and D201 are also part of the temperature-compensated oscillator circuit. The dc voltage applied to varactor D201 from U201 pin 25 is determined by a temperature-compensation algorithm within U201, and is specific to each crystal Y201, based on a unique code assigned to the crystal that identifies its temperature characteristics. Stability is better than 2.5 ppm over temperatures of -30 to 60°C. Software-programmable electronic frequency adjustment is achieved by an internal DAC which provides a frequency adjustment voltage from U201 pin 25 to varactor D201.

The synthesizer IC U201 further divides the 16.8 MHz signal to 2.1 MHz, 2.225 MHz, or 2.4 MHz for use as reference frequencies. It also provides a buffered 16.8 MHz signal at U201 pin 19 for use by the ASFICcmp.

To achieve fast locking of the synthesizer, an internal adapt charge pump provides higher current at U201 pin 45 to quickly force the synthesizer within lock range. The required frequency is then locked by the normal mode charge pump at pin 43. A loop filter (C243–C245 and R243–R245) removes noise and spurs from the steering voltage applied to the VCO varactors, with additional filtering located in the VCO circuit.

Both the normal and adapt charge pumps get their supply from the capacitive voltage multiplier made up of C221–C224 and D220–D221. Two 3 V square waves from U201 pins 14–15 provide the drive signals for the voltage multiplier, which generates 12.1 V at U201 pin 47. This voltage is filtered by C225–C228.

One of the auxiliary outputs of the synthesizer IC (AUX3, U201 pin 2) provides the TRB signal which determines the operating mode of the VCO, either receive or transmit.

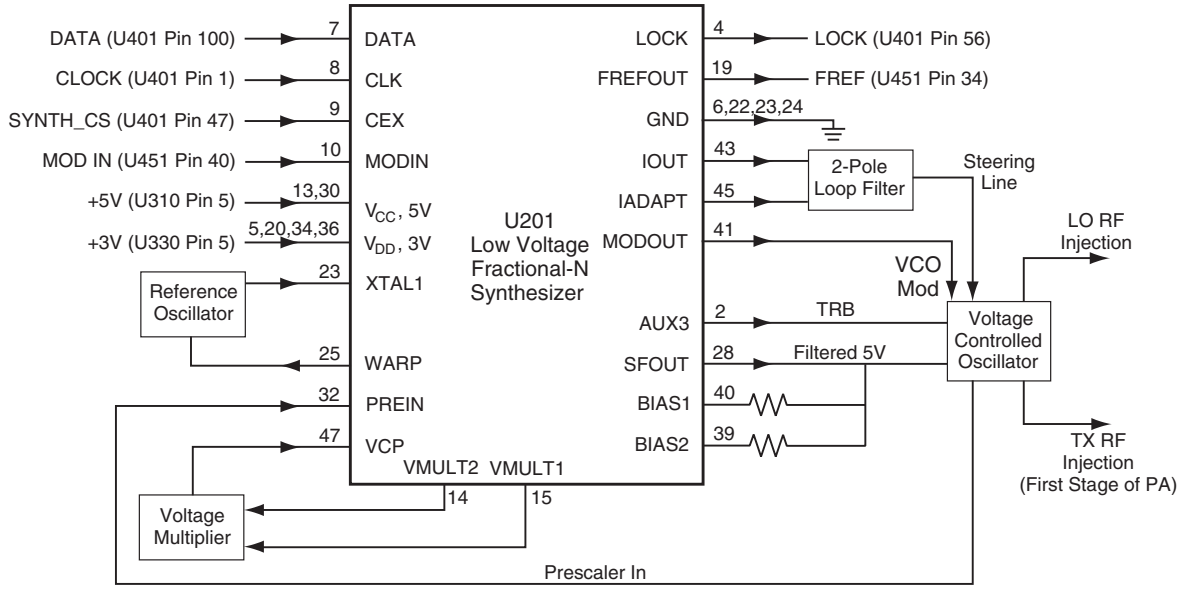


Figure 10-4. UHF Synthesizer Block Diagram

10.4.2 Voltage Controlled Oscillator (VCO)

The VCOBIC (U251), shown in Figure 10-5, in conjunction with the Fractional-N synthesizer (U201) generates RF in both the receive and the transmit modes of operation. The TRB line (U251 pin 19) determines which oscillator and buffer are enabled. A sample of the RF signal from the enabled oscillator is routed from U251 pin 12 through a low pass filter, to the prescaler input of the synthesizer IC (U201 pin 32). After frequency comparison in the synthesizer, a resultant DC control voltage is used to steer the VCO frequency. When the PLL is locked on frequency, this voltage can vary between 3.5 V and 10 V. L251 and C252 further attenuate noise and spurs on the steering line voltage.

In the receive mode, the TRB line (U251 pin 19) is low. This activates the receive VCO and the receive buffer of U251, which operate within the range of 420.15 to 450.15 MHz. The VCO frequency is determined by tank inductor L254, C253–C257, and varactor D251. The buffered RF signal at U251 pin 8 is further amplified by Q280 and applied as RX_INJ to the low-pass injection filter in the receiver front end circuit.

In the transmit mode, U251-19 is driven high by U201 pin 2, enabling the transmit VCO and buffer. The 465–495 MHz RF signal from U251 pin 10 is applied as TX_INJ to the input of the transmitter circuit via matching network C290–C291 and L291. TX VCO frequency is determined by L264,

C263–C267, and varactor D261. High-port audio modulation from the synthesizer IC is applied as VCO_MOD to varactor D262 which modulates the transmit VCO.

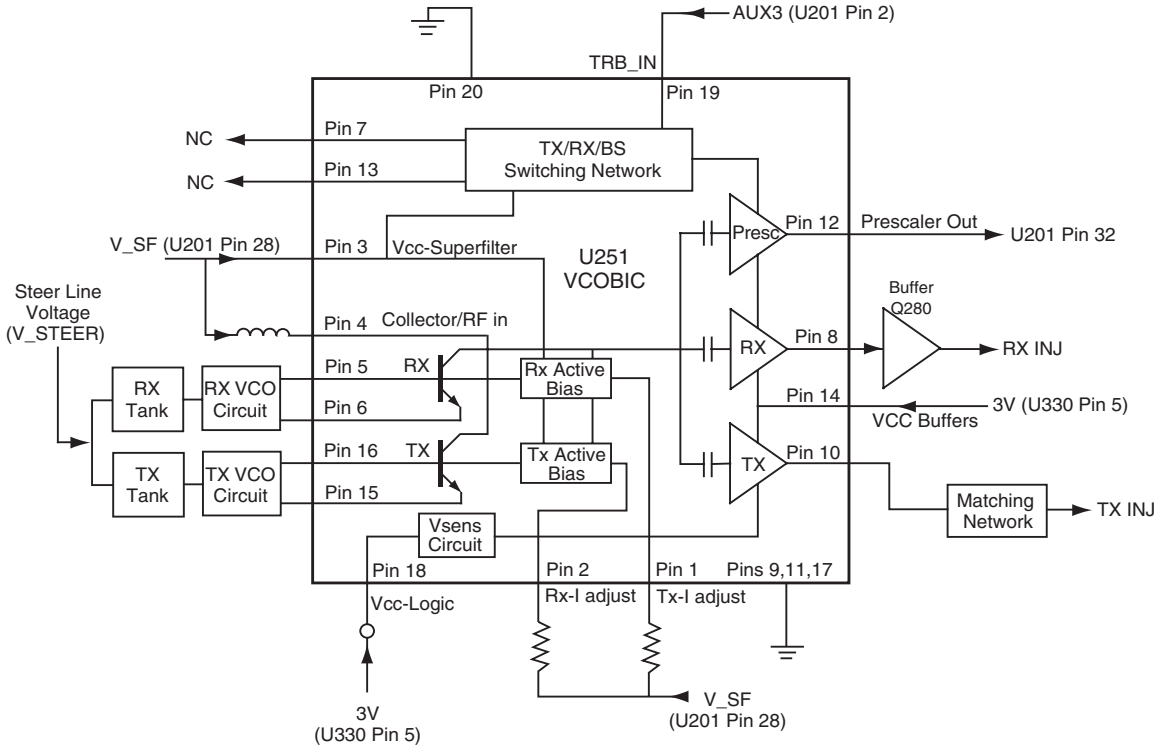


Figure 10-5. UHF VCO Block Diagram

Notes

Chapter 11 490–527 MHz UHF Theory Of Operation

11.1 Introduction

This chapter provides a detailed theory of operation for the radio components. Schematic diagrams for the circuits described in the following paragraphs are located in Chapter 13 of this manual.

11.2 UHF Receiver

The UHF receiver covers the range of 490–527 MHz and provides switchable IF bandwidth for use with 20/25/30 kHz or 12.5 kHz channel spacing systems. The receiver is divided into two major blocks, as shown in Figure 11-1.

- Front End
- Back End

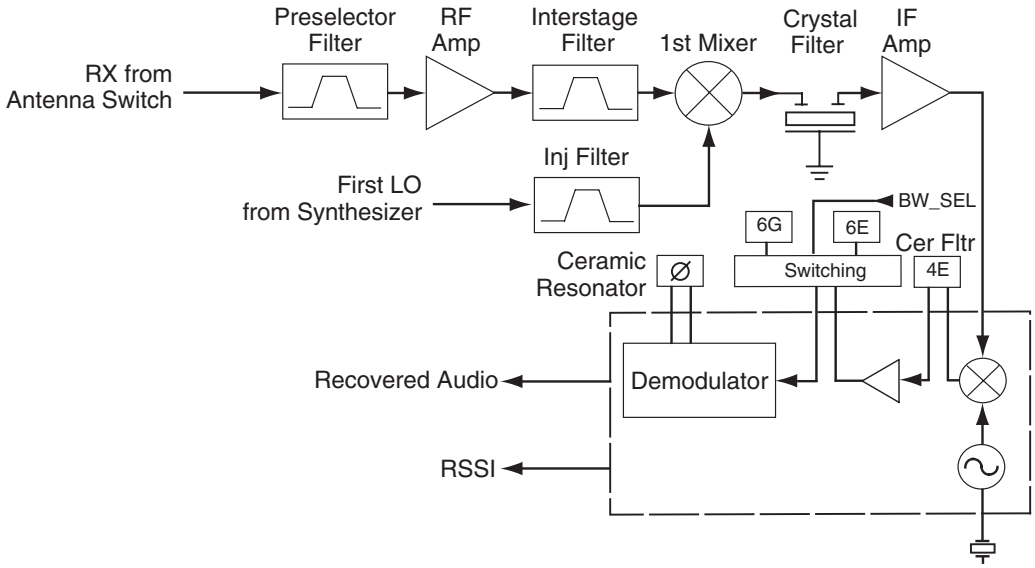


Figure 11-1. UHF Receiver Block Diagram

11.2.1 Receiver Front End

Incoming RF signals from the antenna are first routed through the harmonic filter and antenna switch, part of the transmitter circuitry, before being applied to the receiver front end. The receiver front end consists of a preselector filter, RF amplifier, an interstage filter, and a double-balanced first mixer.

The preselector filter is a fixed-tuned 3-pole Butterworth design using discrete elements (L1–L3, C1–C10, C12 and C523) in a shunt-resonator configuration. It has a 3 dB bandwidth of 68 MHz centered at 508 MHz, an insertion loss of 2.4 dB and image attenuation of 35 dB at 418 MHz. Diode CR1 protects the RF amplifier by limiting excessive RF levels. The filter bandwidth is considerably wider than the receive band, to achieve low insertion loss in a compact size. C523 provides a transmission-zero to improve image attenuation.

The output of the filter is matched to the base of RF amplifier Q21, which provides 17 dB of gain and a noise figure of <2 dB. A BFS505 device is used for high gain, low noise figure and reduced operating current. Operating voltage is obtained from the 5R source, which is turned off during transmit to reduce dissipation in Q21. Current mirror Q22 maintains the operating current of Q21 constant at 8 mA regardless of device and temperature variations, for optimum dynamic range and noise figure.

The output of the RF amplifier is applied to the interstage filter, a fixed-tuned 4-pole Butterworth shunt-coupled resonator design having a 3 dB bandwidth of 68 MHz centered at 508 MHz, and insertion loss of 3.2 dB. This filter yields an image rejection of 49 dB at 437.3 MHz, assisted by a transmission-zero at 300 MHz implemented by C524 for the reasons mentioned above.

The output of the interstage filter is connected to the passive double-balanced mixer consisting of components T41, T42, and CR41. This mixer has a conversion loss of 7.2 dB. Low-side injection from the frequency synthesizer is filtered by L40–L41 and C41–C45 to remove second harmonic energy that may degrade half-IF spurious rejection performance. The injection filter has a 3 dB bandwidth of 100 MHz centered at 408 MHz, and an insertion loss of 2.5 dB. The second-harmonic rejection is typically 40 dB or greater. The filtered injection signal is applied to T42 at a level of +6 dBm.

The mixer output is applied to a diplexer network (L51–L52, C51, R51) which matches the 44.85 MHz IF signal to crystal filter FL51, and terminates the mixer into 50Ω at all other frequencies.

11.2.2 Receiver Back End

The receiver back end is a dual conversion design. High IF selectivity is provided by FL51, a 4-pole fundamental mode 44.85 MHz crystal filter with a minimum 3 dB bandwidth of ±6.7 kHz, a maximum 20 dB bandwidth of + 12.5 kHz, and a maximum insertion loss of 3.5 dB. The output is matched to IF amplifier stage Q51 by L53 and C93. Q51 provides 16 dB of gain and a noise figure of 1.8 dB. The dc operating current is 1 mA. The output of Q51 is applied to the input of the receiver IFIC U51. Diode CR51 limits the maximum RF level applied to the IFIC.

The IFIC is a low-voltage monolithic FM IF system incorporating a mixer/oscillator, two limiting IF amplifiers, quadrature detector, logarithmic received signal strength indicator (RSSI), voltage regulator and audio and RSSI op amps. The second LO frequency, 44.395 MHz, is determined by Y51. The second mixer converts the 44.85 MHz high IF frequency to 455 kHz.

Additional IF selectivity is provided by two ceramic filters, FL52 (between the second mixer and IF amp) and FL53 or FL54 (between the IF amp and the limiter input). The wider filter FL53 is used for 20/25 kHz channel spacing, and the narrower filter FL54 is used for 12.5 kHz channels. When the BW_SEL line is high, the two upper diodes in packages D51 and D52 are forward biased, selecting FL53 for 20/25 kHz channels. When the BW_SEL line is low, the two lower diodes in packages D51 and D52 are forward biased, selecting FL54 for 12.5 kHz channels.

The ceramic filters have the following specifications:

	FL52	FL53	FL54
Number of Elements:	4	6	6
Insertion Loss:	4 dB	4 dB	4 dB
6 dB Bandwidth:	15 kHz	15 kHz	9 kHz
50 dB Bandwidth:	30 kHz	30 kHz	22 kHz
Stopband Rejection:	27 dB	47 dB	47 dB

Ceramic resonator Y70 provides phase vs. frequency characteristic required by the quadrature detector, with 90 degree phase shift occurring at 455 kHz. Buffer Q70 provides a lower driving impedance from the limiter to the resonator, improving the IF waveform and lowering the distortion of the recovered audio signal. The recovered audio level at the DEMOD output is 120 mV rms (25 kHz channel, 3 kHz deviation) or 60 mV rms (12.5 kHz channel, 1.5 kHz deviation). An additional RSSI output provides a DC voltage level that is proportional to RF signal level. This voltage is measured by an A/D converter contained in the microprocessor (PE4_AN4, U401 pin 63).

11.3 UHF Transmitter

The UHF transmitter covers the range of 490–527 MHz. Depending on model, the output power of the transmitter is either switchable on a per-channel basis between high power (4 watts) and low power (1 watt), or is factory preset to 2 watts. The transmitter is divided into four major blocks as shown in Figure 11-2.

- Power Amplifier
- Harmonic Filter
- Antenna Matching Network
- Power Control.

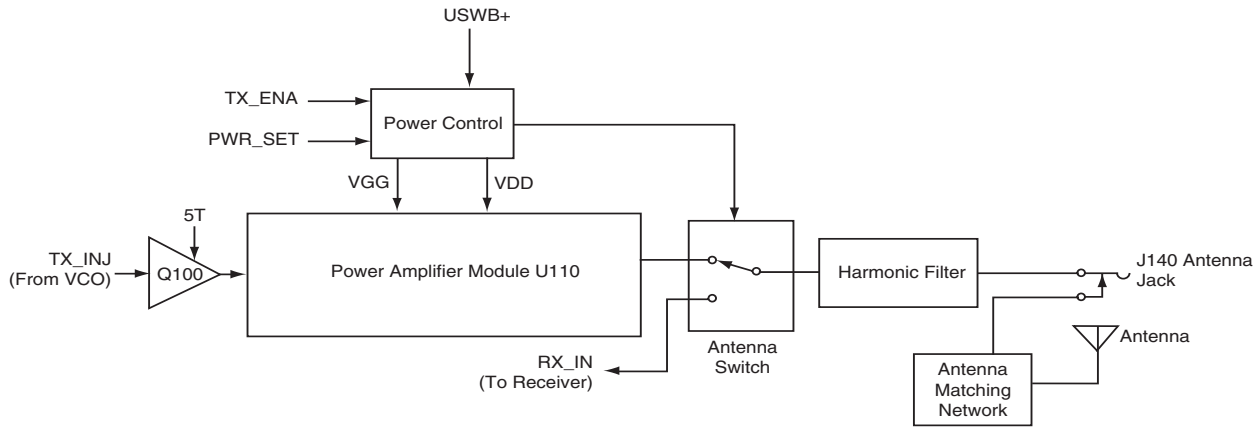


Figure 11-2. UHF Transmitter Block Diagram

11.3.1 Transmitter Power Amplifier

The transmitter power amplifier has three stages of amplification. The first stage, Q100, operates in Class A from the 5T source. It provides 17 dB of gain and an output of 50 mW. The current drain is typically 30mA. Components C105 and L103 match the output of Q100 to the 50Ω input of the module U110.

U110 is a two stage Silicon MOS FET power amplifier module. Drain voltage is obtained from UNSW B+ after being routed through current-sense resistor R150 in the power control circuit. The output power of the module is controlled by varying the DC gate bias on U110 pin 2 (VGG).

11.3.2 Antenna Switch

The antenna switch consists of two pin diodes, D120 and D121. In the receive mode, both diodes are off. Signals applied at the antenna or at jack J140 are routed, via the harmonic filter, through network C122–C124 and L121, to the receiver input. In the transmit mode, Q170 is on and TXB+ is present, forward-biasing both diodes into conduction. The diode current is 20 mA, set by R120–R121. The transmitter RF from U110 is routed through D120, and via the harmonic filter to the antenna jack. D121 conducts, shunting RF power and preventing it from reaching the receiver. L121 is selected to appear as a 1/4 wave at UHF, so that the low impedance of D121 appears as a high impedance at the junction of D120 and the harmonic filter input. This provides a high series impedance and low shunt impedance divider between the power amplifier output and receiver input.

11.3.3 Harmonic Filter

The harmonic filter consists of components C130–C136 and L130–L132. The harmonic filter is a seven-pole Chebychev low-pass configuration, optimized for low insertion loss, with a 3 dB frequency of approximately 620 MHz and typically less than 0.9 dB insertion loss in the passband.

11.3.4 Antenna Matching Network

The harmonic filter presents a 50Ω impedance to antenna jack J140. A matching network, made up of L140–L141 and C141, is used to match the antenna impedance to the harmonic filter. This optimizes the performance of the transmitter and receiver into the impedance presented by the antenna, significantly improving the antenna's efficiency.

11.3.5 Power Control

The power control circuit is a dc-coupled amplifier whose output is the dc gate bias voltage (VGG) applied to the two stages of the RF power amplifier U110.

The output power of the transmitter is adjusted by varying the setting of the power-set DAC contained in the ASFICcmp IC (DACG, U451 pin 6). This PWR_SET voltage is applied to U150 pin 3.

Stage U150-2 compares the voltage drop across current sense resistor R150 to the voltage drop across resistor R151 caused by current flow through Q150, and adjusts its output (pin 7) to maintain equal voltages at pins 5 and 6. Thus the current flow through Q150, and hence its emitter voltage, is proportional to the current drawn by stage U110, which is in turn proportional to the transmitter output power. The emitter voltage of Q150 is applied to U150 pin 2, where it is compared to the power set voltage PWR_SET at pin 3.

The output of U150 pin 1 is divided by R110 and R111 and applied as a gate voltage to the power amplifier U110. By varying this gate voltage as needed to keep the voltages at U150 pins 2 and 3 equal, power is maintained at the desired setting. Excessive final current, for example due to antenna mismatch, causes a lowering of the voltage at U150 pin 6, an increased voltage at pin 2, and a lowering of the voltage at pin 1 and of the gate voltage VGG. This prevents damage to the final stage due to excessive current.

11.4 UHF Frequency Generation Circuitry

The frequency generation system, shown in Figure 11-3, is composed of two circuit blocks, the Fractional-N synthesizer IC U201, the VCO/Buffer IC U251, and associated circuitry. Figure 11-4 shows the peripheral interconnect and support circuitry used in the synthesizer block, and Figure 11-5 details the internal circuitry of the VCOBIC and its interconnections to the surrounding components. Refer to the schematic to identify reference designators.

The Fractional-N synthesizer is powered by regulated 5 V and 3 V provided by U310 and U330 respectively. 5 V is applied to U201 pins 13 and 30, and 3 V is applied to pins 5, 20, 34 and 36. The synthesizer in turn generates a super-filtered 4.5 V supply (VSF, from pin 28) to power U251. In addition to the VCO, the synthesizer also interfaces with the logic and ASFICcmp circuits. Programming for the synthesizer is accomplished through the microprocessor SPI_DATA_OUT, SPI_CLK, and SYNTH_CS (chip select) lines (U409 pins 100, 1 and 47 respectively). A logic high (3 V) from U201 pin 4 indicates to the microprocessor that the synthesizer is locked.

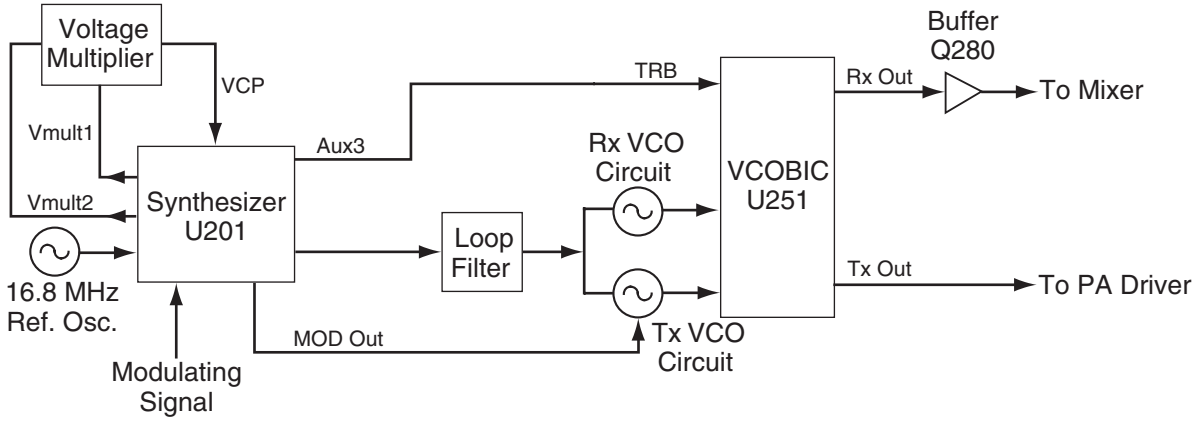


Figure 11-3. UHF Frequency Generation Unit Block Diagram

Transmit modulation from the ASFICcmp (U451 pin 40) is applied to U201 pin 10 (MOD_IN). An electronic attenuator in the ASFICcmp adjusts overall transmitter deviation by varying the audio level applied to the synthesizer IC. Internally the audio is digitized by the Fractional-N synthesizer and applied to the loop divider to provide the low-port modulation. The audio is also routed through an internal attenuator for the purpose of balancing the low port and high port modulation and reducing the deviation by 6 dB for 12.5 kHz channels, and is available at U201 pin 41 (VCO_MOD). This audio signal is routed to the VCO's modulator.

11.4.1 Fractional-N Synthesizer

The Fractional-N synthesizer, shown in Figure 11-4, uses a 16.8 MHz crystal (Y201) to provide the reference frequency for the system. External components C201–C203, R202 and D201 are also part of the temperature-compensated oscillator circuit. The dc voltage applied to varactor D201 from U201 pin 25 is determined by a temperature-compensation algorithm within U201, and is specific to each crystal Y201, based on a unique code assigned to the crystal that identifies its temperature characteristics. Stability is better than 2.5 ppm over temperatures of -30 to 60°C. Software-programmable electronic frequency adjustment is achieved by an internal DAC which provides a frequency adjustment voltage from U201 pin 25 to varactor D201.

The synthesizer IC U201 further divides the 16.8 MHz signal to 2.1 MHz, 2.225 MHz, or 2.4 MHz for use as reference frequencies. It also provides a buffered 16.8 MHz signal at U201 pin 19 for use by the ASFICcmp.

To achieve fast locking of the synthesizer, an internal adapt charge pump provides higher current at U201 pin 45 to quickly force the synthesizer within lock range. The required frequency is then locked by the normal mode charge pump at pin 43. A loop filter (C243–C245 and R243–R245) removes noise and spurs from the steering voltage applied to the VCO varactors, with additional filtering located in the VCO circuit.

Both the normal and adapt charge pumps get their supply from the capacitive voltage multiplier made up of C221–C224 and D220–D221. Two 3 V square waves from U201 pins 14–15 provide the drive signals for the voltage multiplier, which generates 12.1 V at U201 pin 47. This voltage is filtered by C225–C228.

One of the auxiliary outputs of the synthesizer IC (AUX3, U201 pin 2) provides the TRB signal which determines the operating mode of the VCO, either receive or transmit.

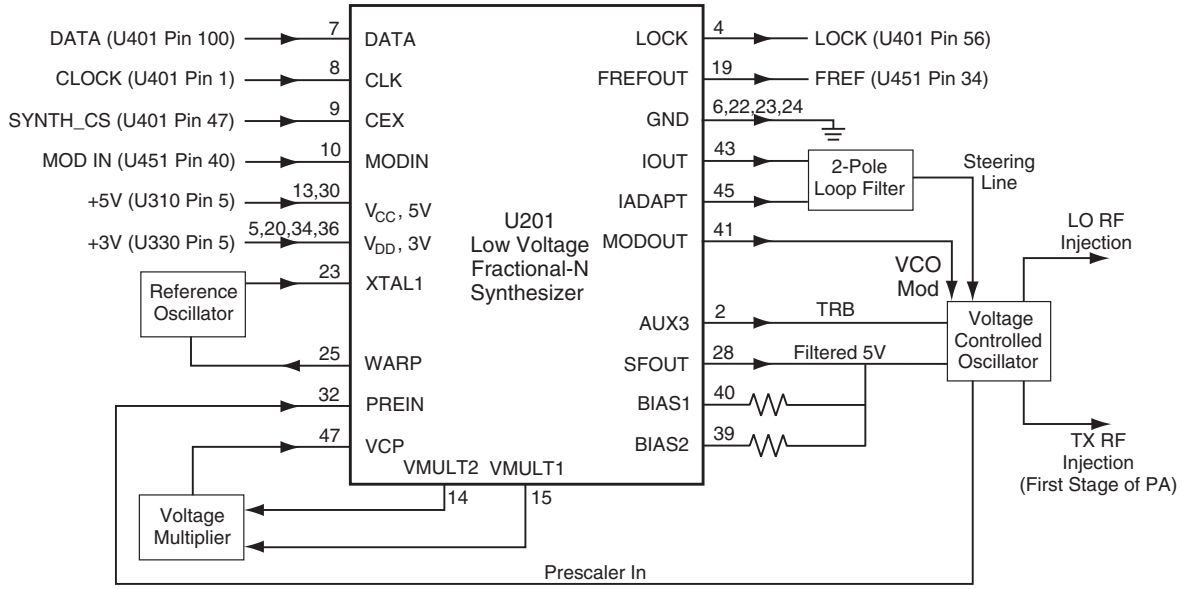


Figure 11-4. UHF Synthesizer Block Diagram

11.4.2 Voltage Controlled Oscillator (VCO)

The VCOBIC (U251), shown in Figure 11-5, in conjunction with the Fractional-N synthesizer (U201) generates RF in both the receive and the transmit modes of operation. The TRB line (U251 pin 19) determines which oscillator and buffer are enabled. A sample of the RF signal from the enabled oscillator is routed from U251 pin 12 through a low pass filter, to the prescaler input of the synthesizer IC (U201 pin 32). After frequency comparison in the synthesizer, a resultant DC control voltage is used to steer the VCO frequency. When the PLL is locked on frequency, this voltage can vary between 3.5 V and 10 V. L251 and C252 further attenuate noise and spurs on the steering line voltage.

In the receive mode, the TRB line (U251 pin 19) is low. This activates the receive VCO and the receive buffer of U251, which operate within the range of 445.12 to 482.15 MHz. The VCO frequency is determined by tank inductor L254, C253–C257, and varactor D251. The buffered RF signal at U251 pin 8 is further amplified by Q280 and applied as RX_INJ to the low-pass injection filter in the receiver front end circuit.

In the transmit mode, U251-19 is driven high by U201 pin 2, enabling the transmit VCO and buffer. The 490–527 MHz RF signal from U251 pin 10 is applied as TX_INJ to the input of the transmitter circuit via matching network C290–C291 and L291.

TX VCO frequency is determined by L264, C263–C267, and varactor D262. High-port audio modulation from the synthesizer IC is applied as VCO_MOD to varactor D261 which modulates the transmit VCO.

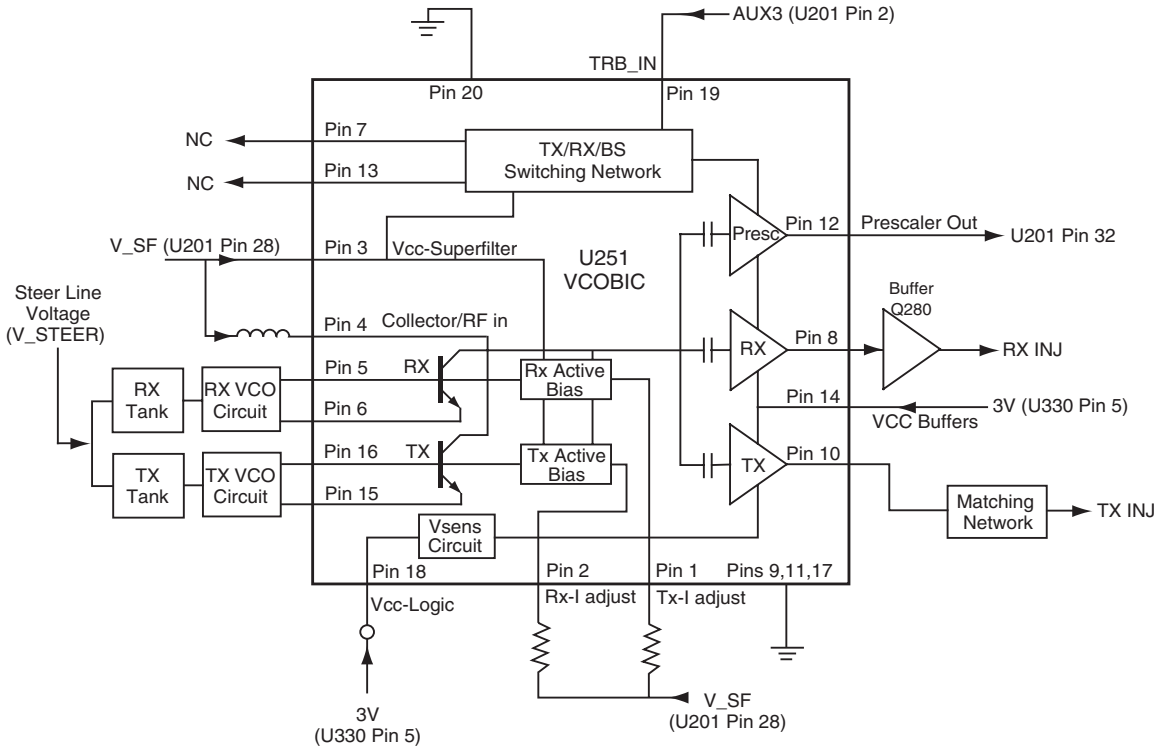


Figure 11-5. UHF VCO Block Diagram

11.5 Keypad

The keypad block diagram is shown in Figure 11-6. Pressing a key creates two distinct voltages KEYPAD_ROW and KEYPAD_COL. These voltages are sent directly to the radio's microprocessor on the main board. The microprocessor then interprets the voltage for KEYPAD_ROW and KEYPAD_COL for each key press.

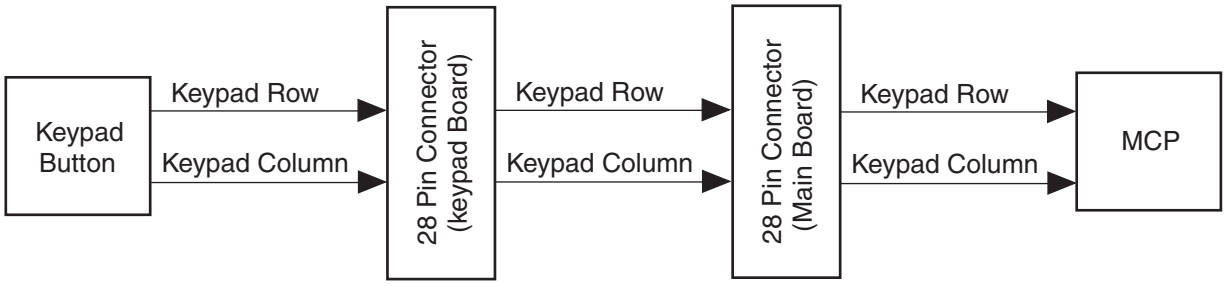


Figure 11-6. Keypad Block Diagram

Notes

Chapter 12 UHF Troubleshooting Tables

12.1 Troubleshooting Table for Receiver

Table 12-1. Troubleshooting Table for Receiver

Symptom	Possible Causes	Procedure	Corrective Action
Radio Dead (no turn-on beep, no LED indication)	1. Battery dead or defective.	Substitute known good battery or battery eliminator.	Charge or replace battery.
	2. Defective batery contacts.	Inspect battery contacts for corrosion or bent terminals.	Clean/repair/replace J301.
	3. Blown fuse	Check voltage on each side of fuse. If blown, 0 VDC after fuse.	Check for short on output, check D301, VR301, troubleshoot/repair as needed, replace fuse.
	4. DC switching fault	Verify battery voltage present at S444 pin 5 when radio is on. Verify Q494-1 is at least 1V dc, Q494-6 is ~0.1V dc, Q493-3 is at Vbatt.	Check/replace on-off-volume control S444. Troubleshoot/replace Q493/4.
	5. Microprocessor not starting up.	Verify clock input to U401-90 (EXTAL) is 7.3975 MHz using high impedance probe. If clock is 3.8MHz, check for shorts on U401 pins. Connect RIB to verify communication via CPS. Verify U401-94 (RESET) is high.	Verify 16.8 MHz signal at U451-34. If OK, troubleshoot/replace U451. If not present, troubleshoot U201 Synthesizer. Reprogram/reflash as needed. If RESET is Low, troubleshoot regulator U320. Check for shorts at U401 pins. Replace U401 (depot only). Reprogram/reflash as needed.
	6. Regulator fault	Verify U310-5 is 5V dc, U320-5 is 3.3V dc, U330-5 is 3V dc.	Check for shorts on outputs, troubleshoot/repair as needed, replace faulty regulator.

Table 12-1. Troubleshooting Table for Receiver (Continued)

Symptom	Possible Causes	Procedure	Corrective Action
No Audio	1. Synthesizer out of lock	Verify U201-4 is at 3V dc.	Troubleshoot synthesizer/VCO circuits.
	2. Defective IFIC	Verify audio is present at U51-8.	Check Q70, Y70, U51.
	3. RX audio buffer fault	Verify audio is present at U451-2.	Check U510 and associated parts.
	4. ASFIC fault	Verify audio is present at U451-41. Verify U451-14 is high.	Check squelch setting, PL/DPL programming. Troubleshoot/ replace U451.
	5. Audio PA fault	Verify U490-1 is <0.2V dc. Verify audio is present at U490-5 and 8.	Check Q490. Check/replace U490.
	6. Defective speaker	Verify audio is present at speaker terminals.	If not, check continuity of J471-2 and 3. Check J491. If yes, replace speaker.
No Receive (squelch noise present)	1. No first injection	Check that RF level at T42-6 is approx +6 dBm. Check that RF level at U251-8 is at least -8 dBm.	Check injection filter C40–44, L40–41. If yes, check Q280 and associated parts. If no, check U251 and components on pins 5 and 6.
	2. No 5R source.	Verify U401-49 is high in RX. Verify Q311 gate is 0V dc in RX Verify Q311 drain is 5V dc in RX.	Check/replace U401 Check/replace Q313. Check for shorts, check/replace Q311.
	3. Harmonic filter or antenna switch fault	Apply on-channel 100 mV RF signal at antenna port. Verify RF level at jct. C1/C2 per schematic.	Check TX harmonic filter, D120–121. Should be 0V dc on D120–121.
	4. Back end fault	Apply on-channel 100 mV RF signal at antenna port. Measure RF levels from FL51 through U51.	Check components prior to loss-of-signal point.
	5. No second injection	Measure RF level at U51-3, verify approx. 280 mV rms.	If dc voltages at U51-3 and 4 are OK, check Y51 and associated parts. If not replace U51.

12.2 Troubleshooting Table for Synthesizer

Table 12-2. Troubleshooting Table for Synthesizer

Symptom	Possible Causes	Procedure	Corrective Action
Synthesizer Out of Lock (RX mode only)	1. VCO fault	Verify oscillator is working, check RF level at U251-10 per schematic. Check dc voltages at U251 pin 2 through 6 and 10 per Table 12-4. Verify steering line voltage is between ~3V and 10V.	Check VCO tank components connected to U251-5 and 6. Check for shorts/opens, replace U251. Check D251 and associated components.
	2. Synthesizer fault	Verify TRB line (from U201-2 to U251-19) is low in RX mode	Check for shorts, check U201 voltages per Table 12-4, replace U201 if incorrect.
	3. Programming fault	Verify RX channel programming is correct.	Re-program if necessary.
Synthesizer Out of Lock (TX mode only)	1. VCO fault	Verify oscillator is working, check RF level at U251-10 per schematic. Check dc voltages at U251 pins 1,3,4,10,15,16 per Table 12-4. Verify steering line voltage is between ~3V and 10V.	Check VCO tank components connected to U251-15 and 16. Check for shorts/opens, replace U251. Check D261 and associated components.
	2. Synthesizer fault	Verify TRB line (U201-2 to U251-19) is high (3V) in TX mode	Check for shorts, check U201 voltages per Table 12-4, replace U201 if incorrect.
	3. Programming fault	Verify TX channel programming is correct.	Re-program if necessary.
Synthesizer Out of Lock (RX and TX modes)	1. VCO fault	Check that RF level at U251-12 is at least 150 mV (VHF) or -12 to -20 dBm (UHF)	If low/missing, check L276, C276-7, R276.
	2. Synthesizer fault	Check that RF level at U201-32 is at least 150 mV (VHF) or -12 to -20 dBm (UHF). Verify steering line voltage is between ~3V and 10V.	If correct, check/replace U201. If incorrect, check R248 and C241. Check loop filter components R243-5 and C243-5.
	3. DC voltage fault	Verify 4.5V dc at U201-28. Verify 12.1V dc at U201-47	Check C231–233, etc., for shorts. If OK check/replace U201. Check for 3V 1.05 MHz sq waves at U201-14 and 15. Check C218–228, D220–221.
	4. Programming fault	Verify channel programming is correct.	Re-program if necessary.

12.3 Troubleshooting Table for Transmitter

Table 12-3. Troubleshooting Table for Transmitter

Symptom	Possible Causes	Procedure	Corrective Action
No Transmit (no TX LED indication)	1. PTT switch defective.	Verify U401-71 goes low when PTT is pressed.	Replace PTT switch S441.
	2. EXT MIC PTT fault	Verify U401-72 goes low when J471-4 is grounded.	Check/replace Q470, L471 etc.
No Transmit (TX LED indication OK)	1. Synthesizer out of lock	Refer to Table 12-2.	Refer to Table 12-2.
	2. No TX_ENABLE	Verify U401-50 is high when pin 71 or 72 is low.	Check/replace U401.
	3. TX DC switch fault	Verify Q171-C is 0V in TX. Verify Q170-C is at Vbatt in TX.	Replace Q171. Check for shorts, replace Q170.
	4. Power control fault	Check Q150 and U150 dc voltages per schematic and Table 12-4.	Repair/replace defective components
	5. No TX injection	Check that RF level at jct. R100/ R101 per schematic.	Check U251, L291–292, C290–291.
	6. No 5T source	Verify Q312 gate is 0V dc in TX Verify Q312 drain is 5V dc in TX.	Check/replace Q313. Check for shorts, check/replace Q312.
	7. TX gain stage failure	Check RF levels at Q100 and U110 per schematic.	Troubleshoot Q100/U110 and associated circuitry.
	8. Antenna switch failure	Verify dc voltage at jct. R122/L120 is approx 1.5V.	Check/replace D120–121, L120–121, R120–122, etc.
Low Power	1. Low TX injection	Check that RF level at jct. R100/ R101 per schematic.	Check U251, L291–292, C290–291.
	2. Low gain in TX stage	Verify dc voltage at Q100-E is ~1.3V (VHF) or ~0.5V (UHF). Verify that RF level at U110-1 is approx. 1V (VHF) or 1.6V (UHF).	Verify 5T voltage is correct. Troubleshoot Q100 circuitry. Troubleshoot Q100 circuitry. Check/replace Q100.
	3. Incorrect control voltage	Verify that the dc voltage at PWR_SET (R162) is approx 1.8V dc (at 1 watt) to 2.6V dc (at 4–5 watts). Verify that the dc voltage at U110-2 is approx 2–3V dc (at 1 watt) to 3–4V dc (at 4–5 watts). (See schematic.)	Check programming. Troubleshoot controller circuitry. Check/replace U451. Troubleshoot U150, Q150 and associated circuitry.
	4. Antenna switch defect	Verify dc voltage at jct. R122/L120 (VHF) or R121/L120 (UHF) is approx 1.7V. *Note: Do not attempt to measure RF or DC voltages at the diodes. Damage to test equipment may occur.*	Check/replace D120–121, L120–121, R120–122, etc.
	5. Harmonic filter defect	Visually inspect components C130–137, L130–132. Check dc continuity of L130–132 *in RX mode only.*	Repair/replace if necessary.

Table 12-3. Troubleshooting Table for Transmitter (Continued)

Symptom	Possible Causes	Procedure	Corrective Action
Poor TX range, conducted power OK	1. RF test jack defective	Verify continuity of J140 pins 3 and 4 *in RX mode only.*	Replace J140.
	2. Antenna matching network fault	Visually inspect components C140–141, L140 or L141. Check dc continuity of L140 or L141*in RX mode only*.	Repair/replace if necessary.
	3. Defective or wrong antenna	Verify correct antenna is installed. Try another antenna.	Replace antenna.
No internal mic audio (EXT MIC audio OK)	1. Mic bias fault	Verify U451-35 is low when side PTT is pressed. Verify Q470-6 is high when side PTT button is pressed.	Check/replace U451. Check/replace R474, R476, and Q470.
	2. Defective mic	Verify approx 1.8V dc across cartridge when side PTT button is pressed. Verify audio present (~10 mV rms) when speaking into mic.	Check mic connector and R478. Replace mic cartridge.
	3. Defective mic jack	Verify continuity between J471 pins 4 and 5.	Replace J471.
No EXT MIC audio	1. Mic bias fault	Verify approx 1.8V dc across EXT MIC cartridge in TX mode. Verify audio present (~10 mV rms) when speaking into mic.	Check Q470. R475, R477, L471. Check VR473, VR475, D470 for shorts.
	2. Audio path fault	Verify mic audio present (~10 mV rms) at U451-46. Verify amplified mic audio present (~200 mV rms) at U451-40.	Check L471, C470. Check/replace U451.
	3. Defective audio accessory	Try another accessory.	Replace defective accessory.

12.4 Troubleshooting Table for Board and IC Signals

Table 12-4. Troubleshooting Table for Board and IC Signals

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U51 IFIC	1	RF input 44.85 MHz	1.20	
	2	RF input decoupling	1.20	
	3	2nd LO osc output	4.02	
	4	2nd LO osc input	4.60	
	5	RSSI output	0.74	(no signal received)
	6	Vcc	4.70	
	7	Audio feedback	0.89	
	8	Audio output	1.44	DEMOD to stage U510
	9	RSSI feedback	0.74	(no signal received)
	10	Quad detector input	2.22	
	11	Limiter output	1.25	
	12	Limiter decoupling 2	1.30	
	13	Limiter decoupling 1	1.30	
	14	Limiter input	1.28	
	15	Ground	GND	
	16	IF amp output	1.22	
	17	IF amp decoupling 2	1.26	
	18	IF amp input	1.26	
	19	IF amp decoupling 1	1.26	
	20	2nd mixer output	3.09	
U52 BW Select Switch	1	Inverter 1 input	0	(25 kHz mode)
	2	Inverter 2 output	0	(25 kHz mode)
	3	Inverter 3 input (NU)	GND	
	4	Ground	GND	
	5	Inverter 3 output (NU)	4.96	
	6	Inverter 2 input	3.00	(25 kHz mode)
	7	Inverter 1 output	4.95	(25 kHz mode)
	8	Vcc	4.96	

Table 12-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U110 RF Power Amp	1	RF input	0	(TX mode)
	2	Vgg (gate bias)	2.65 (typ)	(TX mode) (4.25V typ at VHF)
	3	Vdd	6.59	(TX mode)
	4	RF output	–	Do not measure
	5	Ground	GND	
U150 Dual Opamp	1	Unit 1 output	4.20 (typ)	(TX mode) (5.8V typ at VHF)
	2	Unit 1 (-) input	2.39 (typ)	(TX mode)
	3	Unit 1 (+) input	2.39 (typ)	(TX mode)
	4	Ground	GND	
	5	Unit 2 (+) input	3.30 (typ)	(TX mode)
	6	Unit 2 (-) input	3.35 (typ)	(TX mode)
	7	Unit 2 output	2.23 (typ)	(TX mode)
	8	Vcc	6.79	(TX mode)
U201 Freq Synthesizer	1	AUX2 output (NU)	0	
	2	AUX3 output (TRB)	0.03	To U251-19 (RX mode)
	3	AUX4 output (NU)	0	
	4	Lock detect output	2.98	To U401-56
	5	PD Vdd	2.98	
	6	Digital ground	GND	
	7	Serial data input	3.23	
	8	Serial clock input	0	
	9	Synth chip select	3.23	From U401-47
	10	Modulation input	1.50	From U451-40
	11	VMULT4 (NU)	2.98	
	12	VMULT3 (NU)	0	
	13	VRO	4.96	
	14	VMULT2	1.49	
	15	VMULT1	1.49	
	16	INDMULT (NU)	0	
	17	NC1	0	
	18	Ref select (NU)	0	
	19	Buffered 16.8 MHz out	1.54	
	20	Analog Vdd	3.00	
	21	V bypass (NU)	1.55	
	22	Analog ground	GND	
	23	Ref osc XTAL1	2.07	

Table 12-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U201 Freq Synthesizer	24	Ref osc XTAL2	0	
	25	Ref osc warp output	3.00	
	26	Superfilter cap	4.48	
	27	Superfilter base (NU)	3.76	
	28	Superfilter output	4.52	
	29	NC2	0	
	30	Superfilter input	4.96	
	31	NC3	0	
	32	Prescaler input	1.97	
	33	Prescaler ground	GND	
	34	Prescaler Vdd	2.99	
	35	Prescaler Vref (NU)	1.97	
	36	Digital Vdd	2.99	
	37	TEST1 (NU)	0.01	
	38	TEST2 (NU)	0	
	39	Bias 2	3.38 (typ)	(1.34V in TX mode)
	40	Bias 1	1.50 (typ)	(3.20V in TX mode)
	41	Modulation output	3.42 (typ)	(1.62V typ in TX mode)
	42	CCOMP (NU)	0.05	
	43	Steering line IOUT	9.62 (typ)	Depends on frequency
	44	PD ground	GND	
	45	Steering line IADAPT	9.62 (typ)	Depends on frequency
	46	Adapt switch (NU)	0	
	47	Voltage from charge pump	12.8	
	48	AUX1 output (NU)	2.98	
U251 VCO / Buffer	1	TX VCO current adjust	4.50	
	2	RX VCO current adjust	4.35	
	3	Superfiltered input	4.51	
	4	Collector RF in amp	4.35	
	5	RX VCO base	1.27	
	6	RX VCO emitter	0.48	
	7	RX switch output (NU)	0	
	8	RX buffered VCO output	3.36	
	9	GND_FLAG	GND	
	10	TX buffered VCO output	3.36	
	11	GND_BUFFERS	GND	

Table 12-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U251 VCO / Buffer	12	Prescaler output	2.26	
	13	TX switch output (NU)	0.06	
	14	Vcc_BUFFERS	3.00	
	15	TX VCO emitter	0	(RX mode)
	16	TX VCO base	0	(RX mode)
	17	GND_LOGIC	GND	
	18	Vcc_LOGIC	3.00	
	19	TRB input	0.03	From U201-2 (RX mode)
	20	FLIP input	GND	
U310 5V Regulator	1	Vin	7.48	
	2	Ground	GND	
	3	Control input	7.48	
	4	Bypass capacitor	1.26	
	5	Vout	4.96	
U320 3.3V Regulator	1	Ground	GND	
	2	Feedback	1.23	
	3	Tap (NU)	0	
	4	Vin	7.48	
	5	Vout	3.23	
	6	Sense (NU)	0	
	7	Error (reset output)	3.20	
	8	Shutdown input	7.48	
U330 3V Regulator	1	Vin	7.48	
	2	Ground	GND	
	3	Control input	7.48	
	4	Bypass capacitor	1.26	
	5	Vout	3.00	
U401 Microprocessor	1	PD4_SCK serial clock input	0	
	2	PD5_SS	3.23	ASFIC chip select
	3	PD6_VLIN	3.23	EEPROM chip select
	4	PG7_R_W	3.21	
	5	PG6_AS	3.23	
	6	PG0_XA13	3.23	
	7	PB7_ADDR15	0.026	
	8	PB6_ADDR14	0.028	
	9	PB3_ADDR11	3.06	

Table 12-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U401 Microprocessor	10	PB1_ADDR9	3.05	
	11	PB2_ADDR10	0.16	
	12	VDD	3.23	
	13	VSS	GND	
	14	PBO_ADDR8	3.05	
	15	PB5_ADDR13	0.13	
	16	PG1_XA14	0.20	
	17	PG4_XA17	3.17	
	18	PG5_XA18	0	
	19	PG3_XA16	3.21	
	20	PG2_XA15	0.30	
	21	PB4_ADDR12	0.22	
	22	PF7_ADDR7	3.03	
	23	PF6_ADDR6	3.08	
	24	PF5_ADDR5	3.06	
	25	PF4_ADDR4	0.16	
	26	PF3_ADDR3	0.26	
	27	PF2_ADDR2	3.06	
	28	PF1_ADDR1	3.06	
	29	PFO_ADDR0	3.05	
	30	PC0_DATA0	0.69	
	31	PC1_DATA1	0.96	
	32	PC2_DATA2	1.10	
	33	PC3_DATA3	0.81	
	34	PC4_DATA4	0.62	
	35	PC5_DATA5	0.68	
	36	PC6_DATA6	0.67	
	37	PC7_DATA7	0.73	
	38	PH7_CSPROG	3.05	
	39	VDDL	3.23	
	40	VSSL	GND	
	41	PH6_CSGP2	3.23	
	42	PH5_CSGP1	3.23	
	43	PH4_CSIO	0	
	44	PH3_PW4	3.21	On/off control output
	45	PH2_PW3	0	

Table 12-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U401 Microprocessor	46	PH1_PW2	3.00	
	47	PH0_PW1	3.23	Synth chip select
	48	XIRQ	3.00	
	49	PI7	1.48	RX enable
	50	PI6	0.01	TX enable
	51	PI5	3.23	
	52	PI4	0	Green LED enable
	53	PI3	0	Red LED enable
	54	PI2	0	
	55	PI1	0	
	56	PI0	2.98	Lock detect from U201-4
	57	MODB_VSTBY	3.22	Boot mode enable
	58	MODA_LIR	3.12	
	59	AVDD	3.23	
	60	PE7_AN7	3.20	
	61	PE6_AN6	3.20	
	62	PE5_AN5	2.91	VOX threshold detect
	63	PE4_AN4	0.73	RSSI input
	64	PE3_AN3	0.14	
	65	PE2_AN2	1.62	
	66	PE1_AN1	0 – 3.3 V	Volume control wiper
	67	PE0_AN0	2.48	33% of battery voltage
	68	VRL	0	
	69	VRH	3.20	
	70	AVSS	GND	
	71	PJ0_CSGP3	3.23	Side PTT button
	72	PJ1_CSGP4	0	External MIC PTT
	73	PJ2	3.23	
	74	PJ3	3.23	
	75	PJ4	3.23	
	76	PJ5	0	
	77	PJ6	3.23	Bottom option button
	78	PJ7	3.23	Top option button
	79	PA0_IC3	0	
	80	PA1_IC2	1.57	
	81	PA2_IC1	3.00	

Table 12-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U401 Microprocessor	82	PA3_IC4_OC5_OC1	3.00	
	83	PA4_OC4_OC1	0	Squelch detect input
	84	PA5_OC3_OC1	0	Channel activity input
	85	PA6_OC2_OC1	0	
	86	PA7_PA1_OC1	0	
	87	VSSR	GND	
	88	VDDR	3.23	
	89	ECLK (NU)	1.60	
	90	EXTAL	1.70	Clock from U451-28
	91	XTAL	1.40	Not used
	92	VDDSYN	0	
	93	XFC (NU)	0	
	94	RESET	3.20	From U320
	95	LVOUT	0	
	96	IRQ	3.20	
	97	PD0_RXD	3.23	
	98	PD1_TXD	1.9	
	99	PD2_MISO	0	
	100	PD3_MOSI	3.23	
U402 EEPROM	1	Chip select	3.23	From U401-3
	2	Serial data out	0	
	3	Write protect	3.23	
	4	Vss	GND	
	5	Serial data in	3.23	
	6	Serial clock	0	
	7	Hold	3.23	
	8	Vcc	3.23	
U404 Flash ROM	1	A11	3.06	
	2	A9	3.08	
	3	A8	3.05	
	4	A13	0.13	
	5	A14	0.31	
	6	NC	3.17	
	7	EN_WE	3.21	From U401-4
	8	Vcc	3.23	
	9	RESET	3.20	

Table 12-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U404 Flash ROM	10	A16	3.17	
	11	A15	0.30	
	12	A12	0.22	
	13	A7	3.03	
	14	A6	3.08	
	15	A5	3.06	
	16	A4	0	
	17	A3	0.24	
	18	A2	3.08	
	19	A1	3.05	
	20	A0	3.05	
	21	D0	0.69	
	22	D1	0.94	
	23	D2	1.08	
	24	GND	GND	
	25	D3	0.78	
	26	D4	0.59	
	27	D5	0.66	
	28	D6	0.67	
	29	D7	0.75	
	30	EN_CE	3.01	From U401-38
	31	A10	0.16	
	32	EN_OE	0	From U401-86
U451 ASFIC_CMP	1	VDD for analog circuits	3.00	
	2	DISC audio input	1.34	From U510
	3	Ground for analog circuits	GND	
	4	DACU output	0	
	5	DACR output	0	
	6	DACG output	2.38 (typ)	Power set (TX mode)
	7	VOX peak detector output	2.91	
	8	PLCAP for DC integrator	0.40	
	9	SQIN	0.01	
	10	Universal audio input/output	0	
	11	VDD for DACs	4.95	
	12	SQCAP	0	
	13	GCB2 general purpose output	0	Audio PA_EN (unsquelched)

Table 12-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U451 ASFIC_CMP	14	GCB1 general purpose output	0	
	15	GCB0 general purpose output	3.00	BW select (25 kHz mode)
	16	Squelch channel activity output	0	To U401-84
	17	Squelch detect digital output	0	To U401-83
	18	PL/low speed data I/O	1.50	
	19	High speed data I/O	3.00	
	20	Chip select	3.23	From U401-2
	21	Serial clock input	0	
	22	Serial data input	3.23	
	23	Ground for clock synthesizer	GND	
	24	Loop filter cap for clock syn	0.74	
	25	PLCAP2 for LS integrator	1.17	
	26	Not used	0	
	27	Vdd for clock synthesizer	3.00	
	28	Clock synthesizer output	1.70	
	29	1200 Hz ref for MDC decode	3.00	
	30	GNDDO	GND	
	31	Ground for digital circuits	GND	
	32	Vdd for analog switches	4.96	
	33	Vdd for digital circuits	3.00	
	34	16.8 MHz master clock input	1.54	
	35	GCB3 general purpose output	3.00	Internal MIC enable
	36	TX audio return from option	0	
	37	GCB4 general purpose output	0	
	38	GCB5 general purpose output	0	
	39	RX audio send to option	1.48	
	40	Modulation output	1.50	To U201-10
	41	RX audio out to power amp	1.51	
	42	Flat TX audio return from option	0.20	
	43	RX audio return to option	1.50	
	44	Flat TX audio send to option	1.50	
	45	Vdd for audio path I/O filters	3.00	
	46	Mic audio input	1.50	
	47	Ground for audio path I/O filters	GND	
	48	Ext mic audio input (not used)	0	

Table 12-4. Troubleshooting Table for Board and IC Signals (Continued)

IC Designator	Pin	Pin Function	DC Voltage	Comments (Condition)
U480 Dual Opamp	1	Unit 1 output	2.48	
	2	Unit 1 (-) input	2.48	
	3	Unit 1 (+) input	2.46	
	4	Ground	GND	
	5	Unit 2 (+) input	0.28	
	6	Unit 2 (-) input	0.29	
	7	Unit 2 output	0	
	8	Vcc	4.96	
U490 Audio Power Amp	1	Enable/shutdown	0.12	(Unsquelched)
	2	Bias reference	3.26	(Unsquelched)
	3	(+) input	3.26	(Unsquelched)
	4	(-) input	3.27	(Unsquelched)
	5	(-) output	3.25	(Unsquelched)
	6	Vcc	7.48	(Unsquelched)
	7	Ground	GND	
	8	(+) output	3.29	(Unsquelched)
U510 Dual Opamp	1	Unit 1 output	1.75	
	2	Unit 1 (-) input	1.56	
	3	Unit 1 (+) input	1.55	
	4	Ground	GND	
	5	Unit 2 (+) input	1.55	
	6	Unit 2 (-) input	1.56	
	7	Unit 2 output	1.38	
	8	Vcc	4.96	

1. All voltages are measured with a high-impedance digital voltmeter and expressed in volts DC relative to ground (0V).
2. Voltages are measured with a DC input voltage of 7.50 + .02 volts DC applied to the battery connector (J301).
3. All voltages are measured in the squelched receive mode, unless otherwise indicated.
4. Voltages are identical for VHF and UHF models unless otherwise indicated.

Notes

Chapter 13 UHF Schematic Diagrams, Overlays, and Parts Lists

13.1 Introduction

This section provides schematic diagrams, overlays, and parts lists for the radio circuit boards and interface connections.

13.1.1 Notes For All Schematics and Circuit Boards

* Component is frequency sensitive. Refer to the Electrical Parts List for value and usage.

1. Unless otherwise stated, resistance values are in ohms (K = 1000), capacitance values are in picofarads (pF) or microfarads (µF), and inductance values are in nanohenries (nH) or microhenries (µH).
2. DC voltages are measured from point indicated to chassis ground using a Motorola DC multimeter or equivalent. If the board has been removed from the chassis, the transmitter module mounting screws may be used for ground connection. (*Note: The antenna nut bracket is not connected to ground.*) Operating mode dependent voltages are followed by (RX) for receive mode, (TX) for transmit mode, (UNSQ) for unsquelched mode, etc.
3. RF voltages on VHF models are measured with a Fluke model 85 RF probe. The indicated voltages expressed in mV (RF) are DC level readings which correspond approximately 1:1 to the RF voltage level in mV rms. RF voltages in the Receiver Front End and Receiver Back End circuits are measured with an on-channel 100 mV (-7 dBm) RF signal applied to the antenna jack J140.
4. RF voltages on UHF models are measured both with a high-impedance RF voltmeter having a bandwidth in excess of 500 MHz (levels are expressed in dBm) and with a Fluke model 85 RF probe [levels are expressed in mV (RF)]. These indicated voltages are DC level readings which correspond approximately 1:1 to the RF voltage level in mV rms, and are only approximate for UHF frequency measurements. RF voltages in the Receiver Front End and Receiver Back End circuits are measured with an on-channel 100 mV (-7 dBm) RF signal applied to the antenna jack J140.
5. Audio voltages are measured with a high-impedance AC rms voltmeter. The indicated voltages are expressed in mV rms. Receive mode voltages are followed by (RX) and are measured with an on-channel signal with 1 kHz modulation at 60% deviation (3 kHz for 25 kHz channels, or 1.5 kHz for 12.5 kHz channels). Transmit mode voltages are followed by (TX) and are measured with a 1 kHz, 10 mV rms signal present at the external microphone input (accessory connector J471 pin 4 hot and pin 7 ground).

6. Reference Designators are assigned in the following manner:

Ref. No. Series	Circuit Block
1–99	RF Front End
100–149	Transmitter RF Stages
150–200	Transmitter Power Control
201–250	Frequency Synthesizer
251–300	VCO
301–400	DC Regulation
401–450	Microprocessor
451–550	Audio

7. Circuit Block Interconnection Legend:

Name	Description
USWB+	Unswitched Battery Voltage (always on)
5V	5 volts (regulated)
5R	5 volts in RX mode only
5T	5 volts in TX mode only
RESET	Low-line reset signal from U320 to uP
D3_3V	Digital 3.3 volts (regulated)
3V	Analog 3 volts (regulated)
TX_ENA	Transmit enable signal from uP to transmitter
PWR_SET	DC voltage from ASFIC to TX power control
DEMOD	RX audio from backend to ASFIC
BW_SEL	Backend filter BW select from ASFIC
RSSI	RX signal strength indication from IFIC to uP
IF_IN/OUT	44.85 MHz from 1st mixer to high IF filter
RF_IN/OUT	RX signal from antenna switch to front end
MOD OUT/IN	TX modulation from ASFIC to synthesizer
16_8_MHZ	Ref osc signal from synthesizer to ASFIC
SYNTH_CS	Synthesizer chip select from uP
SPI_CLK	Serial clock from uP
SPI_DATA_OUT	Serial data from uP
LOCK	Lock detect indication from synth to uP
PRESC	VCO freq feedback from VCOBIC to synth
V_STEER	Steering line voltage from synth to VCO's
V_SF	Super-filtered 4.5 volts from synth to VCOBIC
VCO_MOD	TX modulation from ASFIC to synthesizer

Name	Description
TRB	TX/RX control from synth to VCOBIC
RX_INJ	Buffered RX VCO output to RX 1st mixer
TX_INJ	TX VCO output to transmitter input

13.1.2 Six Layer Circuit Board

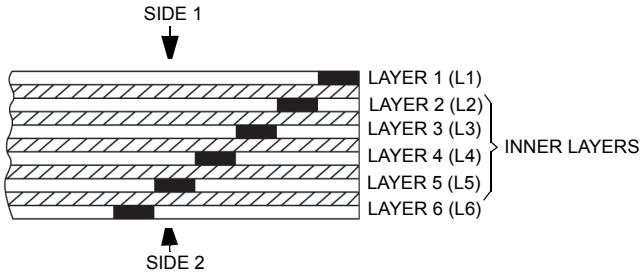


Figure 13-1. Six-Layer Circuit Board: Copper Steps in Layer Sequence

13.2 Speaker and Microphone Schematic

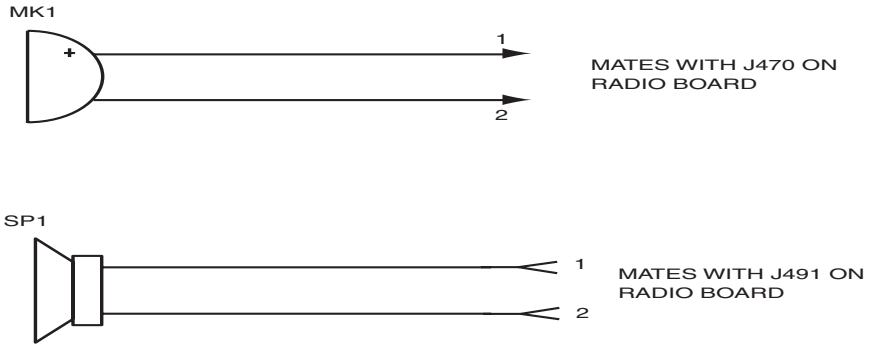


Figure 13-2. Speaker and Microphone Schematic

13.2.1 Speaker and Microphone Parts List

Reference Designator	Motorola Part No.	Description
MK1	5080258E16	Microphone, electret
SP1	5005679X04	Speaker assembly with connector

Notes

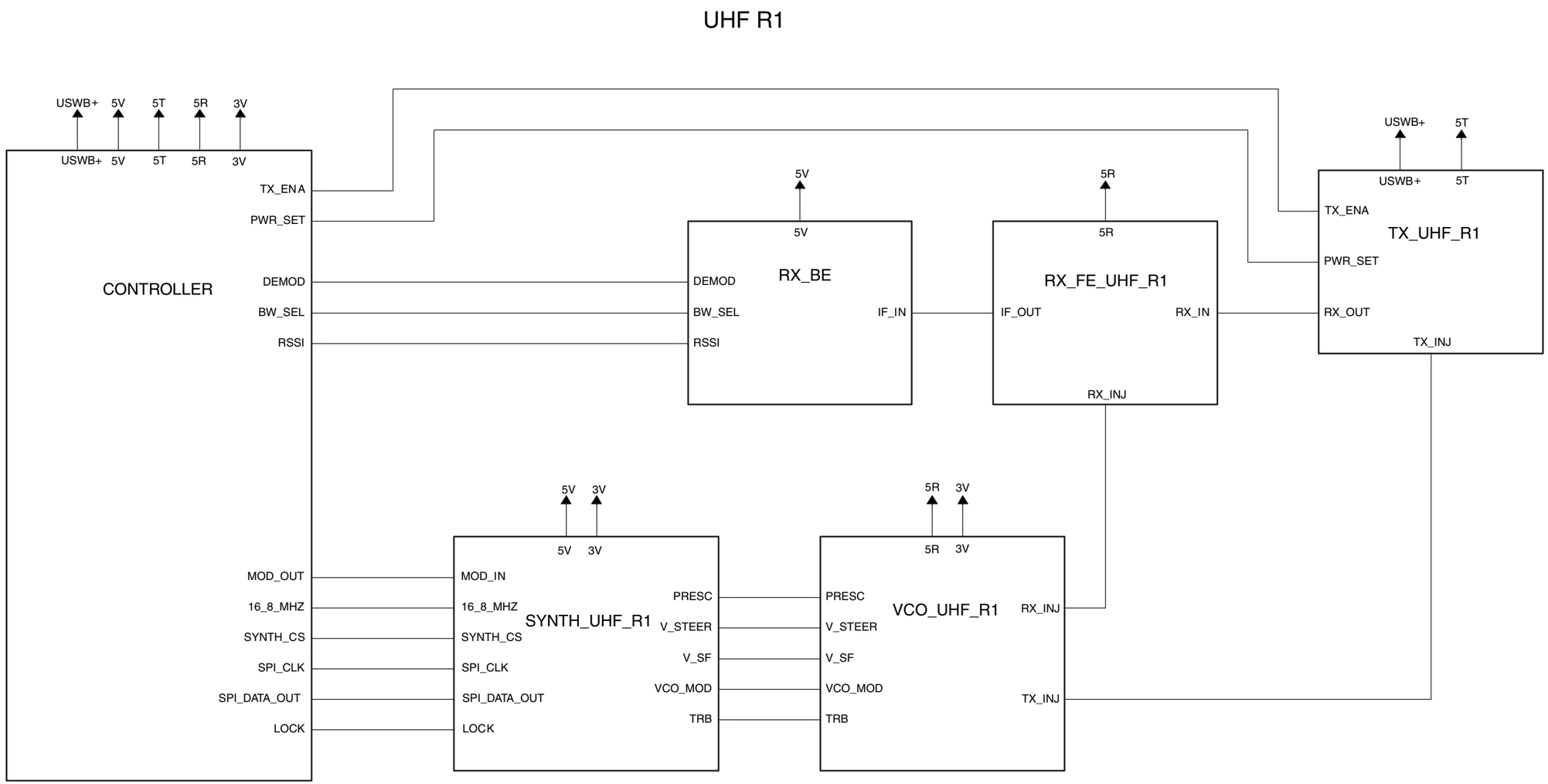


Figure 13-3. UHF (403–440 MHz) Radio Circuit Block Diagram (8486635Z03-O)

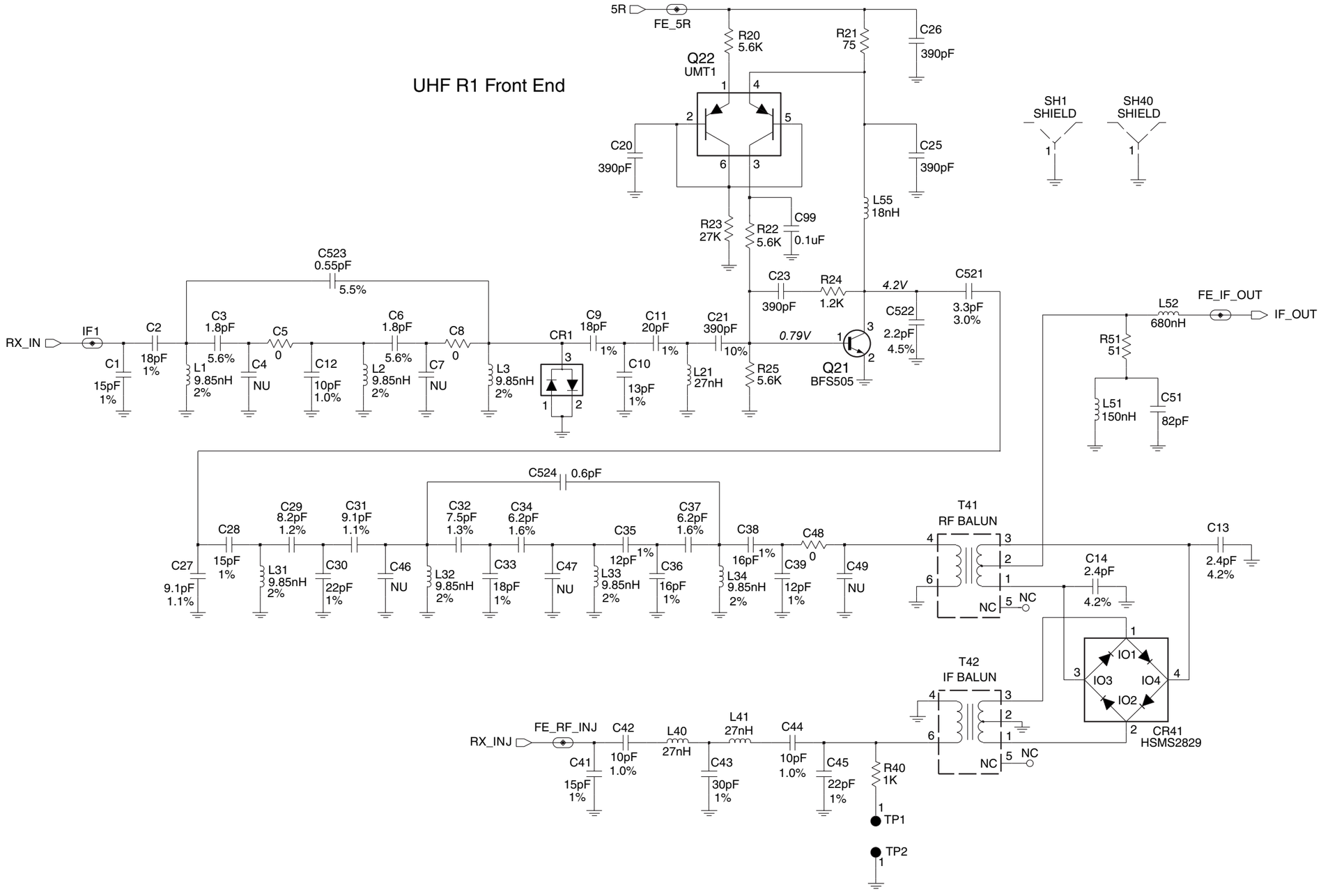


Figure 13-4. UHF (403–440 MHz) Receiver Front End Schematic Diagram (8486635Z03-O)

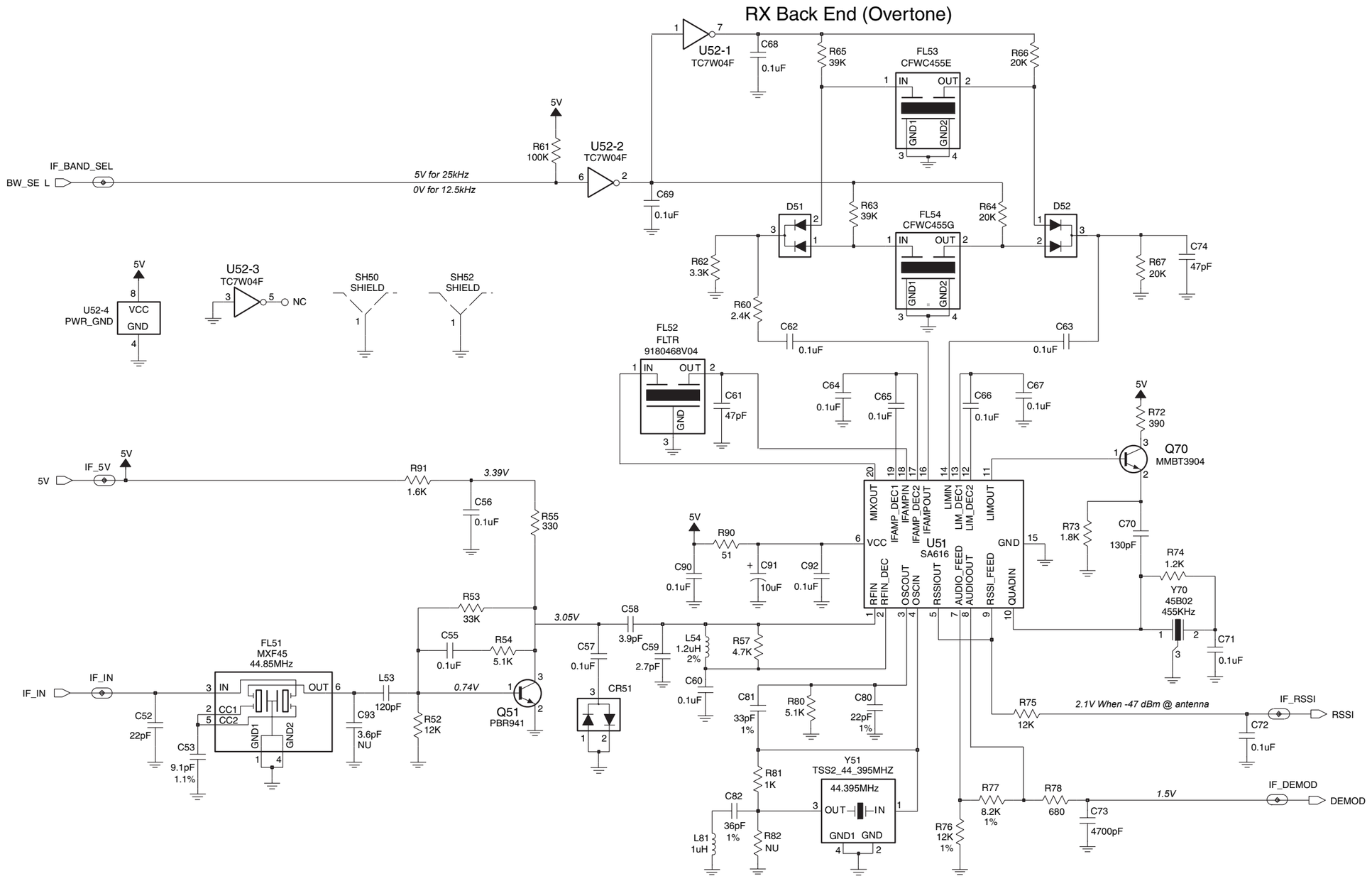
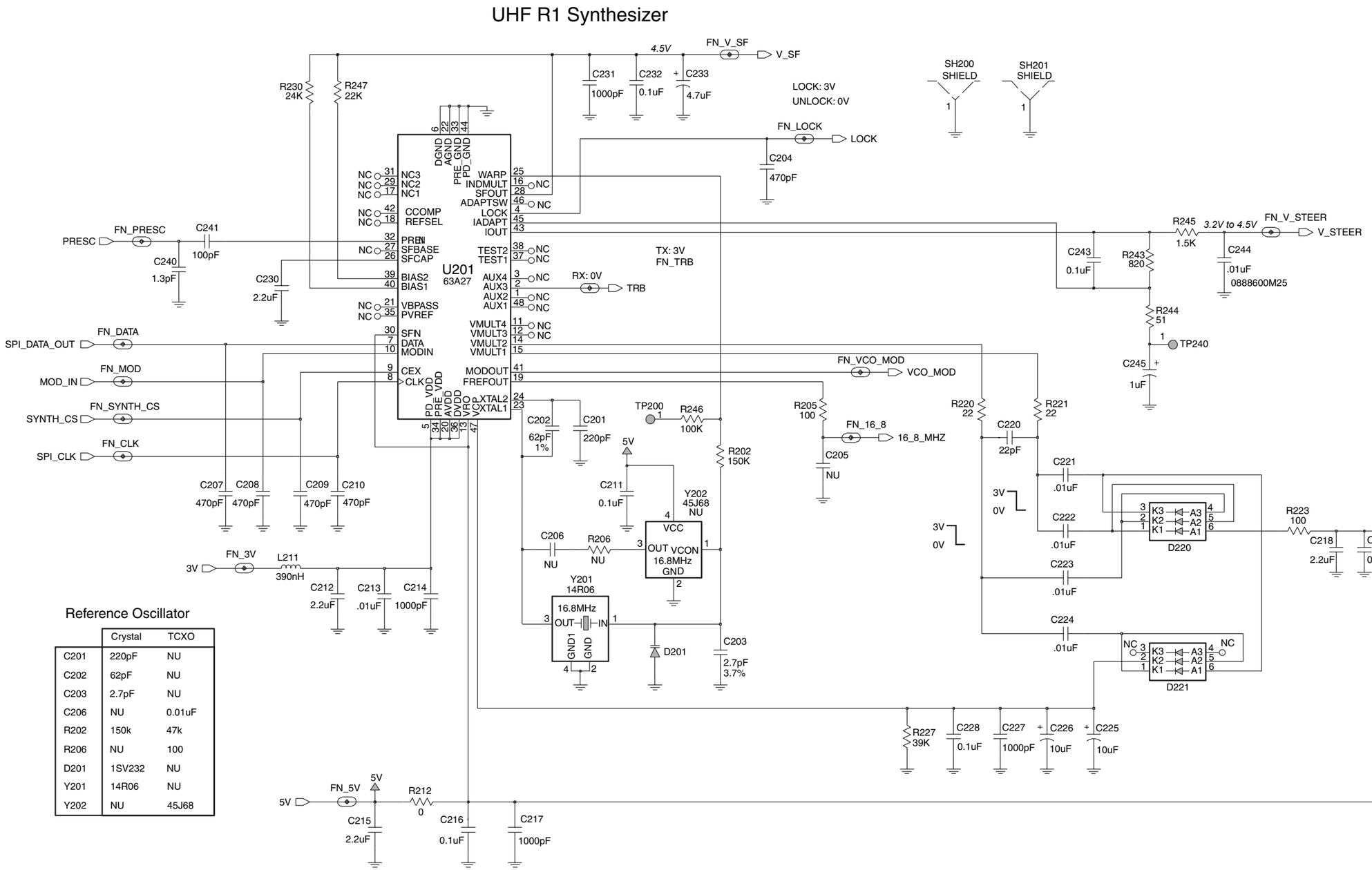


Figure 13-5. UHF (403–440 MHz) Receiver Back End Schematic Diagram (8486635Z03-O)



	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 13-6. UHF (403–440 MHz) Synthesizer Schematic Diagram (8486635Z03-O)

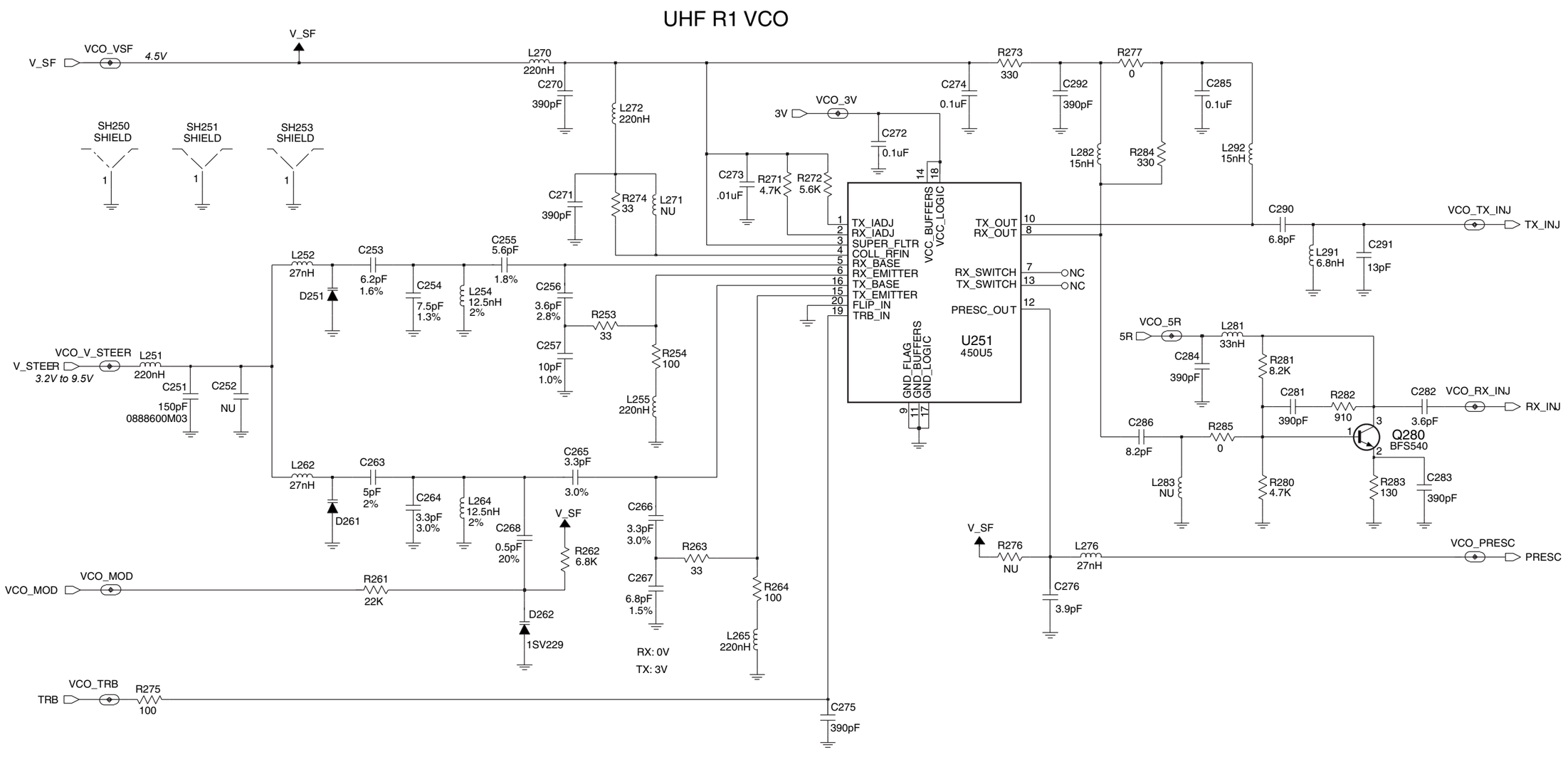


Figure 13-7. UHF (403–440 MHz) Voltage Controlled Oscillator Schematic Diagram (8486635Z03-O)

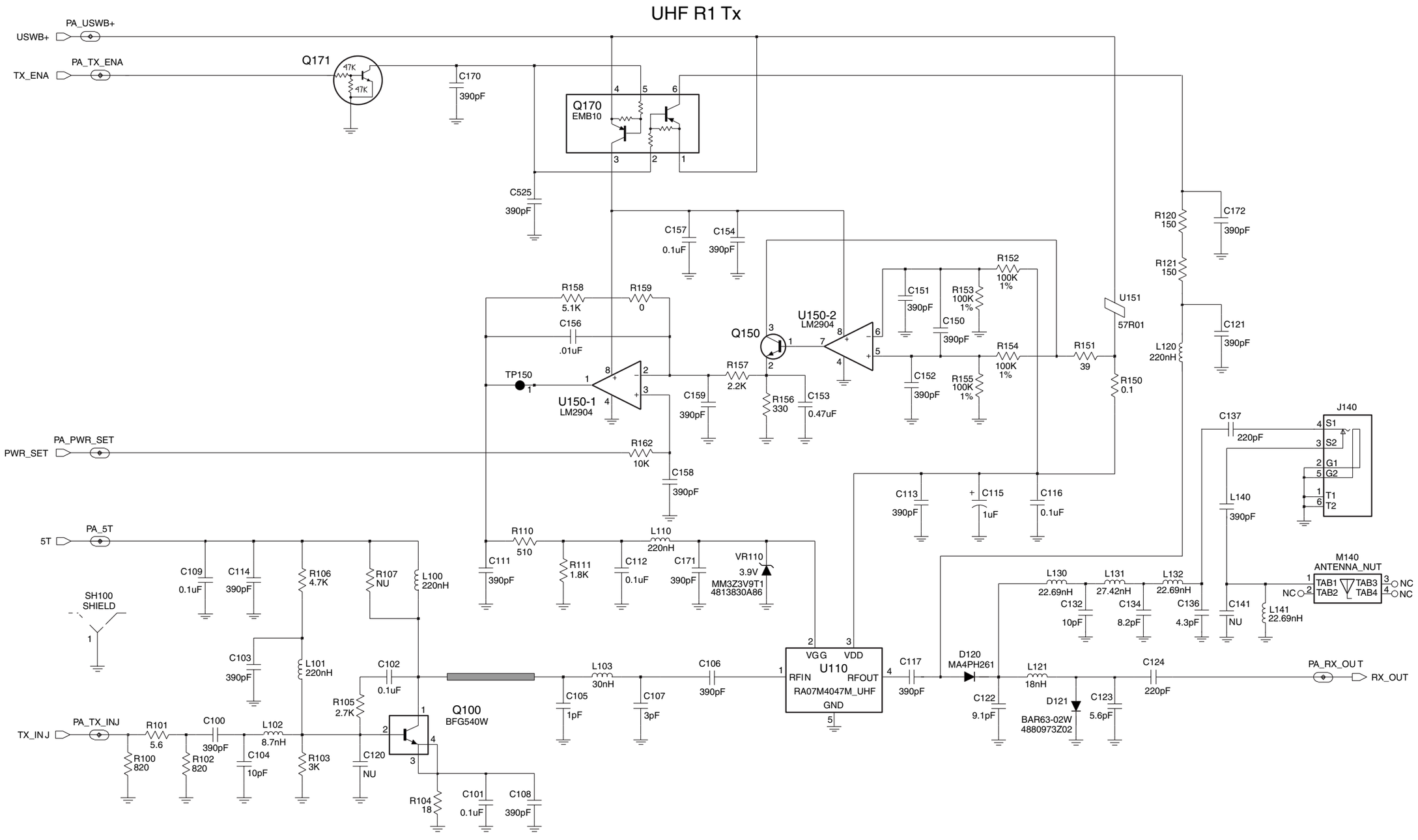


Figure 13-8. UHF (403–440 MHz) Transmitter and Power Control Schematic Diagram (8486635Z03-O)

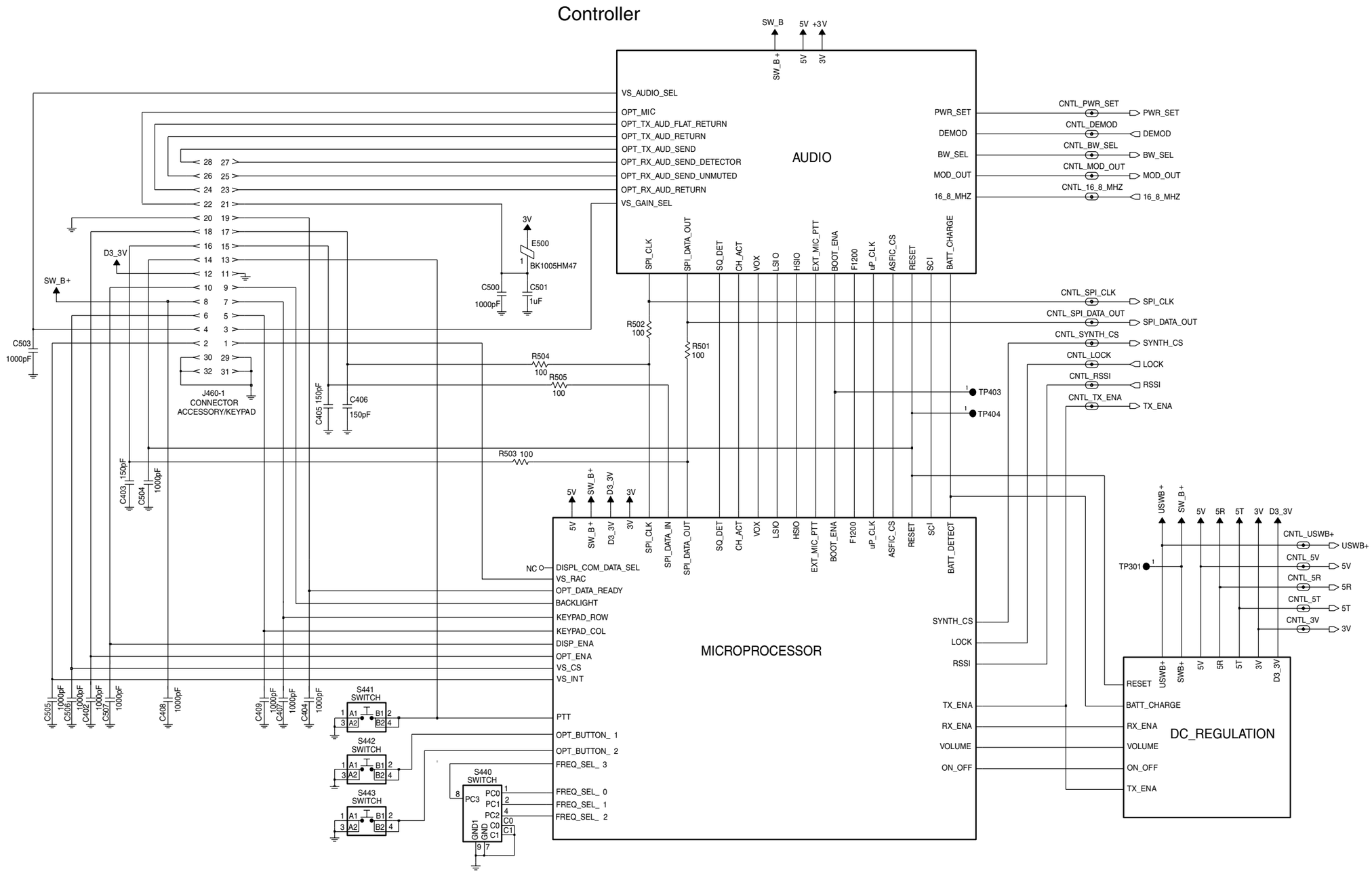


Figure 13-9. UHF (403–440 MHz) Controller Interconnect Schematic Diagram (8486635Z03-O)

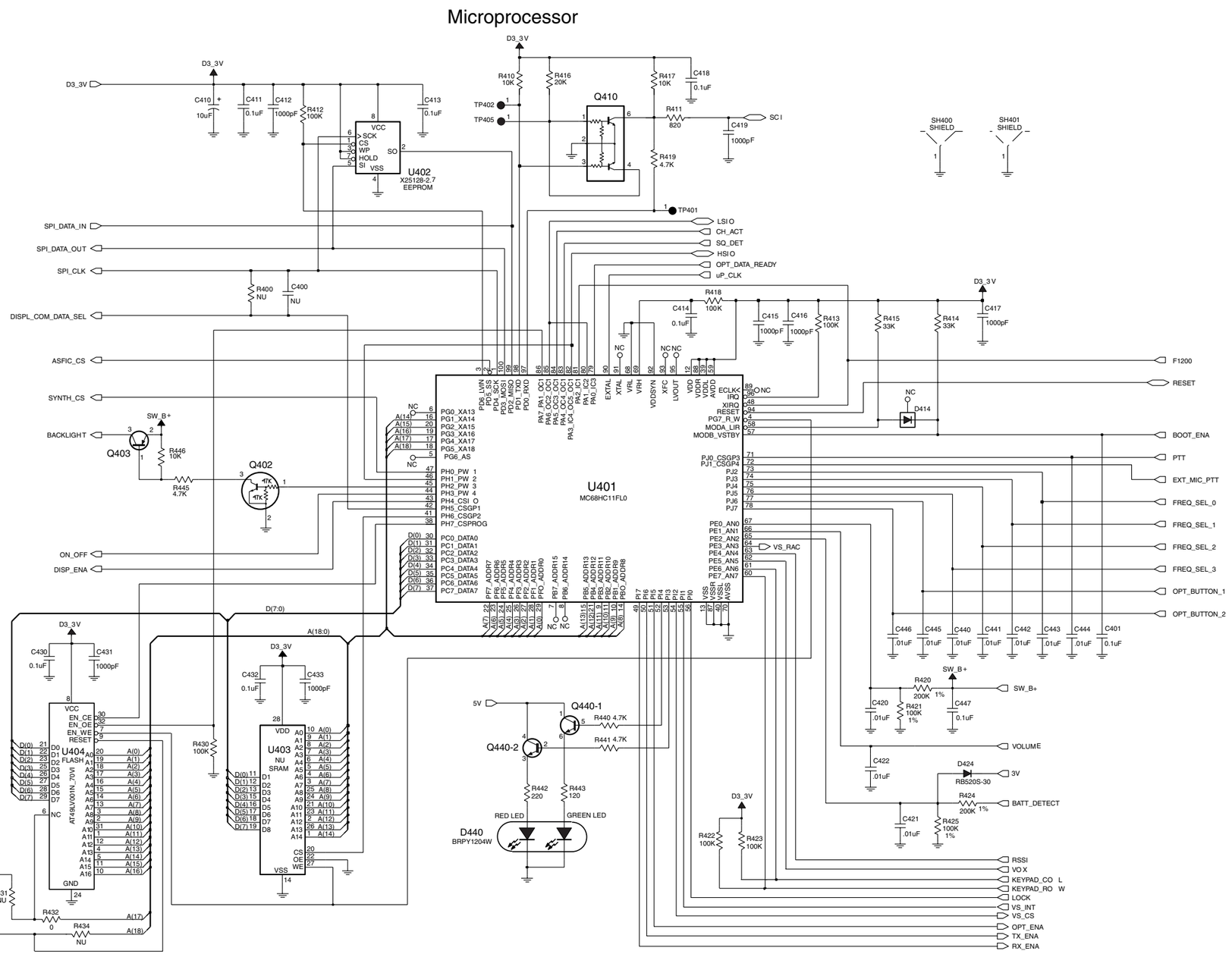
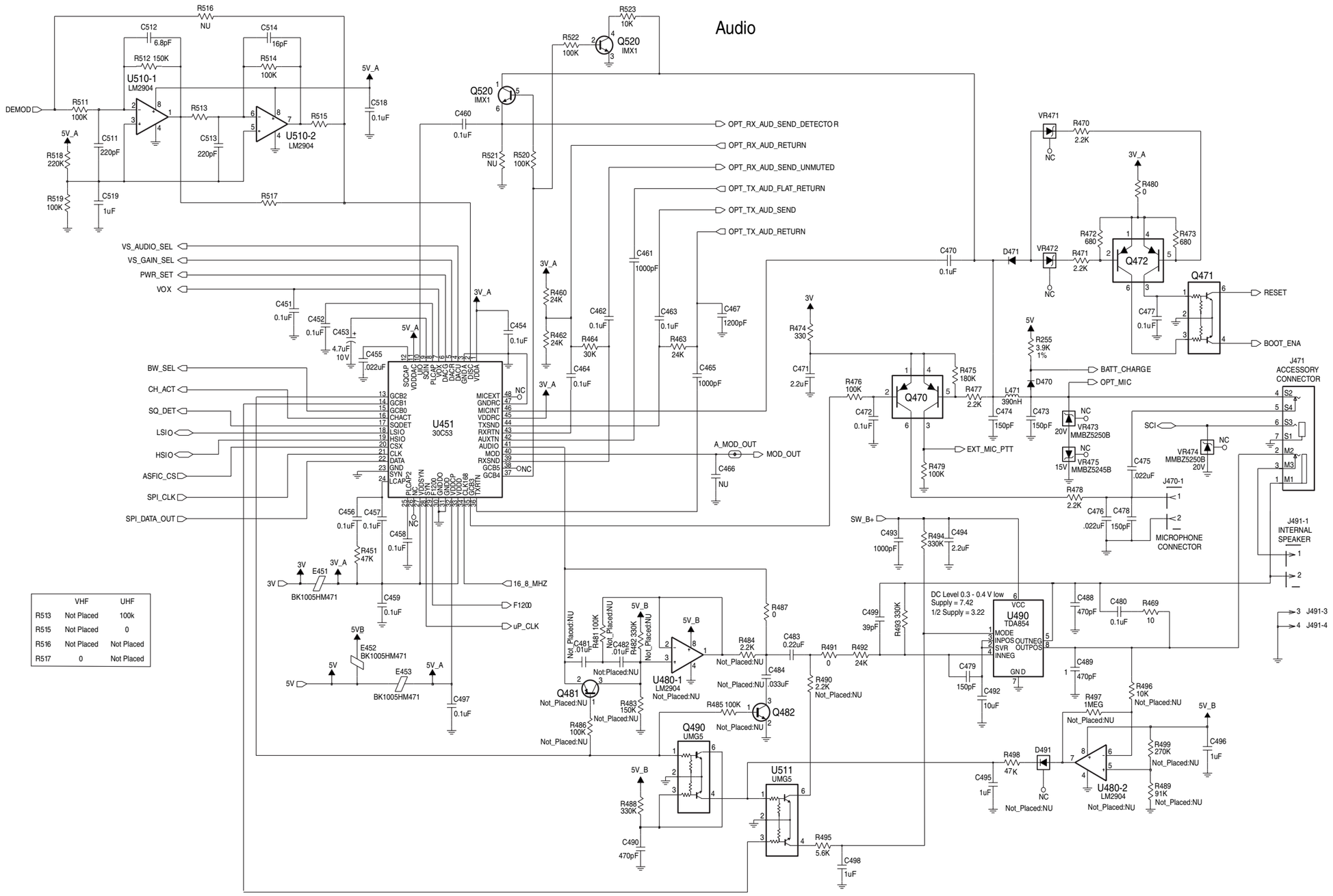


Figure 13-10. UHF (403–440 MHz) Microprocessor Circuitry Schematic Diagram (8486635Z03-O)


Audio
U510-1
LM2904
U510-2
LM2904
U451
30C53
U480-1
LM2904
U480-2
LM2904
U490
TDA854
Q470
Q471
Q472
Q481
Q482
Q490
UMG5
U511
UMG5
Q520
IMX1
J471
ACCESSORY CONNECTOR
J470-1
MICROPHONE CONNECTOR
J491-1
INTERNAL SPEAKER
J491-3
J491-4
DEMOD
VS_AUDIO_SEL
VS_GAIN_SEL
PWR_SET
VOX
BW_SEL
CH_ACT
SQ_DET
LSIO
HSIO
ASFIC_CS
SPI_CLK
SPI_DATA_OUT
16_8_MHZ
F1200
uP_CLK
OPT_RX_AUD_SEND_DETECTOR
OPT_RX_AUD_RETURN
OPT_RX_AUD_SEND_UNMUTED
OPT_TX_AUD_FLAT_RETURN
OPT_TX_AUD_SEND
OPT_TX_AUD_RETURN
A_MOD_OUT
MOD_OUT
EXT_MIC_PTT
BATT_CHARGE
OPT_MIC
RESET
BOOT_ENA
SW_B+
SCI
DC Level 0.3 - 0.4 V low
Supply = 7.42
1/2 Supply = 3.22
R516 NU
C512 6.8pF
C514 16pF
R512 150K
R514 100K
R511 100K
R513
R515
C511 220pF
C513 220pF
C518 0.1uF
R518 220K
R519 100K
C519 1uF
R517
R520 100K
R521 NU
R522 100K
R523 10K
C460 0.1uF
C461 1000pF
C462 0.1uF
C463 0.1uF
C464 0.1uF
C465 1000pF
C466 NU
C467 1200pF
R460 24K
R462 24K
R463 24K
R464 30K
C451 0.1uF
C452 0.1uF
C453 4.7uF 10V
C454 0.1uF
C455 .022uF
C456 0.1uF
C457 0.1uF
C458 0.1uF
C459 0.1uF
R451 47K
E451 BK1005HM471
E452 BK1005HM471
E453 BK1005HM471
C497 0.1uF
C470 0.1uF
D471
VR471
VR472
R470 2.2K
R471 2.2K
R472 680
R473 680
R480 0
C477 0.1uF
R474 330
C471 2.2uF
R476 100K
R475 180K
R477 2.2K
L471 390nH
C472 0.1uF
C474 150pF
C473 150pF
D470
R255 3.9K 1%
VR473 MMBZ5250B
VR475 MMBZ5245B
VR474 MMBZ5250B
C475 .022uF
R478 2.2K
C476 .022uF
C478 150pF
R479 100K
C493 1000pF
R494 330K
C494 2.2uF
R493 330K
C499 39pF
C479 150pF
C492 10uF
C488 470pF
C480 0.1uF
R469 10
C489 470pF
R496 10K Not_Placed:NU
R497 1MEG Not_Placed:NU
R498 47K
D491
C495 1uF
R499 270K Not_Placed:NU
R489 91K Not_Placed:NU
C496 1uF
R487 0
C483 0.22uF
R491 0
R492 24K
R484 2.2K Not_Placed:NU
C484 .033uF Not_Placed:NU
R490 2.2K Not_Placed:NU
C481 .01uF Not_Placed:NU
R481 100K Not_Placed:NU
C482 .01uF Not_Placed:NU
R482 330K Not_Placed:NU
R483 150K Not_Placed:NU
R485 100K Not_Placed:NU
R486 100K Not_Placed:NU
R488 330K
C490 470pF
R495 5.6K
C498 1uF
C491 NU
R491 NU
R492 NU
R493 NU
R494 NU
R495 NU
R496 NU
R497 NU
R498 NU
R499 NU
R500 NU
R501 NU
R502 NU
R503 NU
R504 NU
R505 NU
R506 NU
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C518 NU
C519 NU

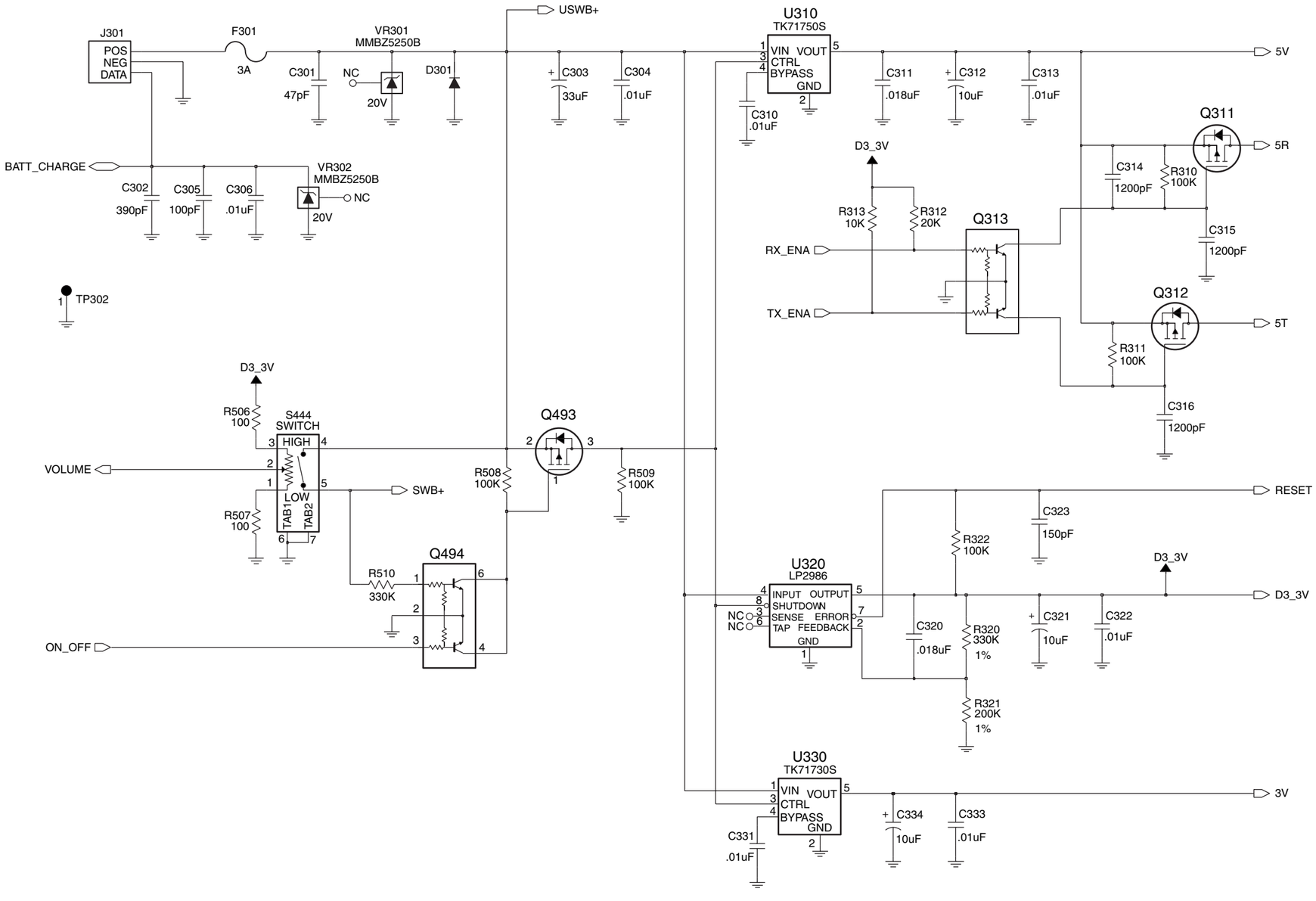


Figure 13-12. UHF (403–440 MHz) DC Regulation Schematic Diagram (8486635Z03-O)

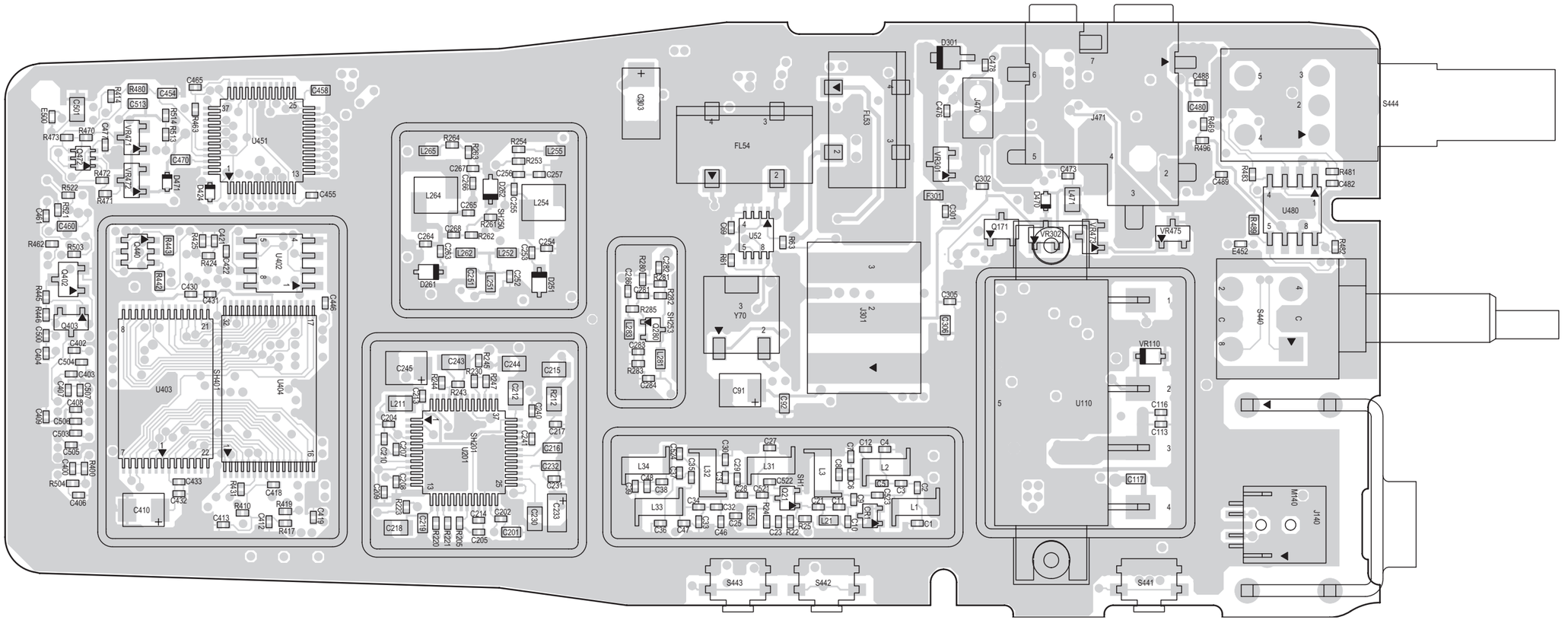


Figure 13-13. UHF (403–440 MHz) Board Component Side View (8486635Z03-O)

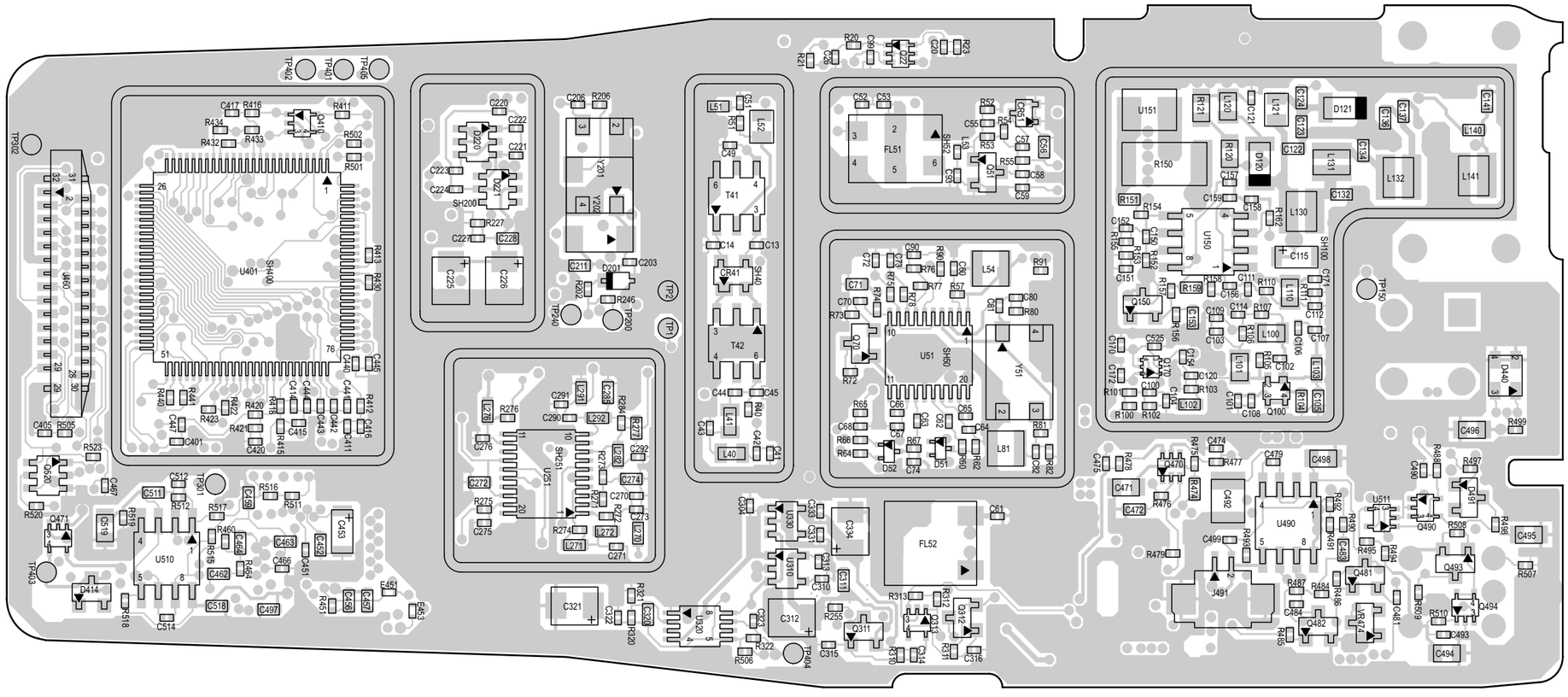


Figure 13-14. UHF (403–440 MHz) Board Solder Side View (8486635Z03-O)

UHF (403–440 MHz) Radio Parts List (8486635Z03-O)

Circuit Ref	Motorola Part No.	Description
C1	2109445U37	CAP, 15pF
C2	2109445U39	CAP, 18pF
C3	2109445U09	CAP, 1.8pF
C4	NOT PLACED	CAP, 20pF
C5	0662057M01	RES, 0
C6	2109445U09	CAP, 1.8pF
C7	NOT PLACED	CAP, 22pF
C8	0662057M01	RES, 0
C9	2109445U39	CAP, 18pF
C10	2109445U36	CAP, 13pF
C11	2109445U40	CAP, 20pF
C12	2109445U27	CAP, 10pF
C13	2109445U12	CAP, 2.4pF
C14	2109445U12	CAP, 2.4pF
C20	2113743L07	CAP, 390pF
C21	2113743L07	CAP, 390pF
C23	2113743L07	CAP, 390pF
C25	2113743L07	CAP, 390pF
C26	2113743L07	CAP, 390pF
C27	2109445U26	CAP, 9.1pF
C28	2109445U37	CAP, 15pF
C29	2109445U25	CAP, 8.2pF
C30	2109445U41	CAP, 22pF
C31	2109445U26	CAP, 9.1pF
C32	2109445U24	CAP, 7.5pF
C33	2109445U39	CAP, 18pF
C34	2109445U22	CAP, 6.2pF
C35	2109445U35	CAP, 12pF
C36	2109445U38	CAP, 16pF
C37	2109445U22	CAP, 6.2pF
C38	2109445U38	CAP, 16pF
C39	2109445U35	CAP, 12pF
C41	2109445U37	CAP, 15pF
C42	2109445U27	CAP, 10pF
C43	2109445U44	CAP, 30pF
C44	2109445U27	CAP, 10pF
C45	2109445U41	CAP, 22pF
C46	NOT PLACED	CAP, 10pF
C47	NOT PLACED	CAP, 10pF
C48	0662057M01	RES, 0
C49	NOT PLACED	CAP, 3.9pF
C51	2113743N48	CAP, 82pF
C52	2109445U39	CAP, 18pF
C53	2109445U26	CAP, 9.1pF
C55	2113743M24	CAP, 0.1uF
C56	2113743E20	CAP, 0.1uF
C57	2113743M24	CAP, 0.1uF
C58	2113743N16	CAP, 3.9pF
C59	2113743N12	CAP, 2.7pF
C60	2113743M24	CAP, 0.1uF
C61	2113743N46	CAP, 68pF
C62	2113743M24	CAP, 0.1uF
C63	2113743M24	CAP, 0.1uF
C64	2113743M24	CAP, 0.1uF
C65	2113743M24	CAP, 0.1uF
C66	2113743M24	CAP, 0.1uF
C67	2113743M24	CAP, 0.1uF
C68	2113743M24	CAP, 0.1uF
C69	2113743M24	CAP, 0.1uF
C70	2113743N53	CAP, 130pF
C71	2113743E20	CAP, 0.1uF
C72	2113743M24	CAP, 0.1uF
C73	2113743L33	CAP, 4700pF
C74	2113743N42	CAP, 47pF
C80	2109445U41	CAP, 22pF
C81	2109445U45	CAP, 33pF
C82	2109445U45	CAP, 33pF
C90	2113743M24	CAP, 0.1uF
C91	2311049A57	CAPP, 10uF
C92	2113743E20	CAP, 0.1uF
C93	NOT PLACED	CAP, 3.6pF
C99	2113743M24	CAP, 0.1uF
C100	2113743L07	CAP, 390pF
C101	2113743M24	CAP, 0.1uF
C102	2113743M24	CAP, 0.1uF
C103	2113743L07	CAP, 390pF
C104	2113743N26	CAP, 10pF
C105	2113740F03	CAP, 1pF
C106	2113743L07	CAP, 390pF
C107	2113743N13	CAP, 3pF
C108	2113743L07	CAP, 390pF
C109	2113743M24	CAP, 0.1uF
C111	2113743L07	CAP, 390pF
C112	2113743M24	CAP, 0.1uF
C113	2113743L07	CAP, 390pF
C114	2113743L07	CAP, 390pF
C115	2311049A07	CAPP, 1uF
C116	2113743M24	CAP, 0.1uF
C117	2113740F65	CAP, 390pF
C120	NOT PLACED	CAP, 8.2pF
C121	2113743L07	CAP, 390pF
C122	2113740F26	CAP, 9.1pF
C123	2113740F21	CAP, 5.6pF
C124	2113740F59	CAP, 220pF
C132	2113740F27	CAP, 10pF
C134	2113740F25	CAP, 8.2pF
C136	2113740F18	CAP, 4.3pF
C137	2113740F59	CAP, 220pF
C141	NOT PLACED	CAP, 8.2pF
C150	2113743L07	CAP, 390pF
C151	2113743L07	CAP, 390pF
C152	2113743L07	CAP, 390pF
C153	2113743K18	CAP, 0.47uF
C154	2113743L07	CAP, 390pF
C156	2113743L41	CAP, .01uF
C157	2113743M24	CAP, 0.1uF
C158	2113743L07	CAP, 390pF
C159	2113743L07	CAP, 390pF
C170	2113743L07	CAP, 390pF
C171	2113743L07	CAP, 390pF
C172	2113743L07	CAP, 390pF
C201	2113740F59	CAP, 220pF
C202	2109445U52	CAP, 62pF
C203	2109445U13	CAP, 2.7pF
C204	2113743L09	CAP, 470pF
C205	NOT PLACED	CAP, 2.7pF
C206	NOT PLACED	CAP, 1000pF
C207	2113743L09	CAP, 470pF
C208	2113743L09	CAP, 470pF
C209	2113743L09	CAP, 470pF
C210	2113743L09	CAP, 470pF
C211	2113743E20	CAP, 0.1uF
C212	2113743F18	CAP, 2.2uF
C213	2113743L41	CAP, .01uF
C214	2113743L17	CAP, 1000pF
C215	2113743F18	CAP, 2.2uF
C216	2113743E20	CAP, 0.1uF
C217	2113743L17	CAP, 1000pF
C218	2113743F18	CAP, 2.2uF
C219	2113743E20	CAP, 0.1uF
C220	2113743N34	CAP, 22pF
C221	2113743L41	CAP, .01uF
C222	2113743L41	CAP, .01uF
C223	2113743L41	CAP, .01uF
C224	2113743L41	CAP, .01uF
C225	2311049A57	CAPP, 10uF
C226	2311049A57	CAPP, 10uF
C227	2113743L17	CAP, 1000pF
C228	2113743E20	CAP, 0.1uF
C230	2113743F18	CAP, 2.2uF
C231	2113743L17	CAP, 1000pF
C232	2113743E20	CAP, 0.1uF
C233	2311049A56	CAPP, 4.7uF
C240	2113743N06	CAP, 1.3pF
C241	2113743N50	CAP, 100pF
C243	0886641Z01	CAP, 0.1uF
C244	0888600M25	CAP, .01uF
C245	2311049A08	CAPP, 1uF
C251	0888600M03	CAP, 150pF
C252	NOT PLACED	CAP, 390pF
C253	2109445U22	CAP, 6.2pF
C254	2109445U24	CAP, 7.5pF
C255	2109445U21	CAP, 5.6pF
C256	2109445U16	CAP, 3.6pF
C257	2109445U27	CAP, 10pF
C263	2109445U29	CAP, 5pF
C264	2109445U15	CAP, 3.3pF
C265	2109445U15	CAP, 3.3pF
C266	2109445U15	CAP, 3.3pF
C267	2109445U23	CAP, 6.8pF
C268	2109445U01	CAP, 0.5pF
C270	2113743L07	CAP, 390pF
C271	2113743L07	CAP, 390pF
C272	2113743E20	CAP, 0.1uF
C273	2113743L41	CAP, .01uF
C274	2113743E20	CAP, 0.1uF
C275	2113743L07	CAP, 390pF
C276	2113743N16	CAP, 3.9pF
C281	2113743L07	CAP, 390pF
C282	2109445U16	CAP, 3.6pF
C283	2113743L07	CAP, 390pF
C284	2113743L07	CAP, 390pF
C285	2113743E20	CAP, 0.1uF
C286	2113743N24	CAP, 8.2pF
C290	2113743N22	CAP, 6.8pF
C291	2113743N29	CAP, 13pF
C292	2113743L07	CAP, 390pF
C301	2113743L07	CAP, 390pF
C302	2113743L07	CAP, 390pF
C303	2311049A97	CAPP, 33uF
C304	2113743L41	CAP, .01uF
C305	2113743N50	CAP, 100pF
C306	2113741F49	CAP, .01uF
C310	2113743L41	CAP, .01uF
C311	2113743E05	CAP, .018uF
C312	2311049A57	CAPP, 10uF
C313	2113743L41	CAP, .01uF
C314	2113743L19	CAP, 1200pF
C315	2113743L19	CAP, 1200pF
C316	2113743L19	CAP, 1200pF
C320	2113743E05	CAP, .018uF
C321	2311049A57	CAPP, 10uF
C322	2113743L41	CAP, .01uF
C323	2113743N54	CAP, 150pF
C331	2113743L41	CAP, .01uF
C333	2113743L41	CAP, .01uF
C334	2311049A57	CAPP, 10uF
C400	NOT PLACED	CAP, .022uF
C401	2113743M24	CAP, 0.1uF
C402	2113743L17	CAP, 1000pF
C403	2113743N50	CAP, 150pF
C404	2113743L17	CAP, 1000pF
C405	2113743N50	CAP, 150pF

Circuit Ref	Motorola Part No.	Description
C406	2113743N50	CAP, 150pF
C407	2113743L17	CAP, 1000pF
C408	2113743L17	CAP, 1000pF
C409	2113743L17	CAP, 1000pF
C410	2311049A57	CAPP, 10uF
C411	2113743M24	CAP, 0.1uF
C412	2113743L17	CAP, 1000pF
C413	2113743M24	CAP, 0.1uF
C414	2113743M24	CAP, 0.1uF
C415	2113743L17	CAP, 1000pF
C416	2113743L17	CAP, 1000pF
C417	2113743L17	CAP, 1000pF
C418	2113743M24	CAP, 0.1uF
C419	2113743L17	CAP, 1000pF
C420	2113743L41	CAP, .01uF
C421	2113743L41	CAP, .01uF
C422	2113743L41	CAP, .01uF
C430	2113743M24	CAP, 0.1uF
C431	2113743L17	CAP, 1000pF
C432	2113743M24	CAP, 0.1uF
C433	2113743L17	CAP, 1000pF
C440	2113743L41	CAP, .01uF
C441	2113743L41	CAP, .01uF
C442	2113743L41	CAP, .01uF
C443	2113743L41	CAP, .01uF
C444	2113743L41	CAP, .01uF
C445	2113743L41	CAP, .01uF
C446	2113743L41	CAP, .01uF
C447	2113743M24	CAP, 0.1uF
C451	2113743M24	CAP, 0.1uF
C452	2113743E20	CAP, 0.1uF
C453	2311049A56	CAPP, 4.7uF
C454	2113743E20	CAP, 0.1uF
C455	2113743L48	CAP, .022uF
C456	2113743E20	CAP, 0.1uF
C457	2113743E20	CAP, 0.1uF
C458	2113743E20	CAP, 0.1uF
C459	2113743E20	CAP, 0.1uF
C460	2113743E20	CAP, 0.1uF
C461	2113743L17	CAP, 1000pF
C462	2113743E20	CAP, 0.1uF
C463	2113743E20	CAP, 0.1uF
C464	2113743E20	CAP, 0.1uF
C465	2113743L17	CAP, 1000pF
C466	NOT PLACED	CAP, 470pF
C467	2113743L19	CAP, 1200pF
C470	2113743E20	CAP, 0.1uF
C471	2113743F18	CAP, 2.2uF
C472	2113743E20	CAP, 0.1uF
C473	2113743N54	CAP, 150pF
C474	2113743N54	CAP, 150pF
C475	2113743L48	CAP, .022uF
C476	2113743L48	CAP, .022uF
C477	2113743M24	CAP, 0.1uF
C478	2113743N54	CAP, 150pF
C479	2113743N54	CAP, 150pF
C480	2113743E20	CAP, 0.1uF
C481	NOT PLACED	CAP, .01uF
C482	NOT PLACED	CAP, .01uF
C483	2113928H02	CAP, 0.22uF
C484	NOT PLACED	CAP, .033uF
C488	2113743L09	CAP, 470pF
C489	2113743L09	CAP, 470pF
C490	2113743L09	CAP, 470pF
C492	2113928J08	CAP, 10uF
C493	2113743L17	CAP, 1000pF
C494	2113743F18	CAP, 2.2uF
C495	2113743F16	CAP, 1uF
C496	2113743F16	CAP, 1uF
C497	2113743E20	CAP, 0.1uF
C498	2113743F16	CAP, 1uF
C499	2113743N40	CAP, 39pF
C500	2113743L17	CAP, 1000pF
C501	2113743F16	CAP, 1uF
C503	2113743L17	CAP, 1000pF
C504	2113743L17	CAP, 1000pF
C505	2113743L17	CAP, 1000pF
C506	2113743L17	CAP, 1000pF
C507	2113743L17	CAP, 1000pF
C511	2113740F59	CAP, 220pF
C512	2113743N22	CAP, 6.8pF
C513	2113740F59	CAP, 220pF
C514	2113743N31	CAP, 16pF
C518	2113743E20	CAP, 0.1uF
C519	2113743F16	CAP, 1uF
C521	2109445U15	CAP, 3.3pF
C522	2109445U11	CAP, 2.2pF
C523	2186463Z04	CAP, 0.55pF
C524	2186463Z05	CAP, 0.6pF
C525	2113743L07	CAP, 390pF
CR1	4813825A19	MMBD352
CR41	4802246J04	HSMS2829
CR51	4813825A19	MMBD352
D51	4802245J97	DAN235ETL
D52	4802245J97	DAN235ETL
D120	4880973Z02	MA4PH261
D121	4880973Z02	MA4PH261
D201	4862824C03	1SV232
D220	4802233J09	IMN10
D221	4802233J09	IMN10
D251	4862824C01	1SV229
D261	4862824C01	1SV229
D262	4862824C01	1SV229
D301	4813833A19	MBRM120ET3
D414	4805129M41	MMBD501
D424	4809924D18	RB520S-30
D440	4805729G49	BRPY1204W
D470	4809924D18	RB520S-30
D471	4809924D18	RB520S-30
D491	NOT PLACED	MMBD501
E451	2480640Z01	BK1005HM471
E452	2480640Z01	BK1005HM471
E453	2480640Z01	BK1005HM471
E500	2480640Z01	BK1005HM471
F301	6580542Z01	FUSE
FL51	9180022M11	MXF45
FL52	9180468V04	FLTR
FL53	9180469V05	CFWC455E
FL54	9180469V03	CFWC455G
J140	0986428Z01	CONN_J
J301	0986565Z01	CONN_J
J460	NOT PLACED	CONN_J
J470	0985818A01	CONN_J
J471	0980683Z03	CONN_J
J491	2809926G01	CONN_P
L1	2409348J15	IDCTR, 9.85nH
L2	2409348J15	IDCTR, 9.85nH
L3	2409348J15	IDCTR, 9.85nH
L21	2413926N17	IDCTR, 27nH
L31	2409348J15	IDCTR, 9.85nH
L32	2409348J15	IDCTR, 9.85nH
L33	2409348J15	IDCTR, 9.85nH
L34	2409348J15	IDCTR, 9.85nH
L40	2413926K16	IDCTR, 27nH
L41	2413926K16	IDCTR, 27nH
L51	2413926N26	IDCTR, 150nH
L52	2462587V44	IDCTR, 680nH
L53	2113743N52	CAP, 120pF
L54	2413923A25	IDCTR, 1.2uH
L55	2413926N15	IDCTR, 18nH
L81	2413923A19	IDCTR, 1uH
L100	2413926K27	IDCTR, 220nH
L101	2413926K27	IDCTR, 220nH
L102	2409377M26	IDCTR, 8.7nH
L103	2409377M31	IDCTR, 30nH
L110	2413926K27	IDCTR, 220nH
L120	2413926K27	IDCTR, 220nH
L121	2462587V25	IDCTR, 18nH
L130	2460591M27	IDCTR, 22.69nH
L131	2460591M32	IDCTR, 27.42nH
L132	2460591M27	IDCTR, 22.69nH
L140	2113740F65	CAP, 390pF
L141	2460591M27	IDCTR, 22.69nH
L211	2413926K30	IDCTR, 390nH
L251	2413926N28	IDCTR, 220nH
L252	2413926N17	IDCTR, 27nH
L254	2484562T11	IDCTR, 12.5nH
L255	2413926N28	IDCTR, 220nH
L262	2413926N17	IDCTR, 27nH
L264	2484562T11	IDCTR, 12.5nH
L265	2413926N28	IDCTR, 220nH
L270	2413926N28	IDCTR, 220nH
L271	NOT PLACED	IDCTR, 220nH
L272	2413926N28	IDCTR, 220nH
L276	2413926N17	IDCTR, 27nH
L281	2413926N18	IDCTR, 33nH
L282	2413926N14	IDCTR, 15nH
L283	NOT PLACED	IDCTR, 22nH
L291	2413926N10	IDCTR, 6.8nH
L292	2413926N14	IDCTR, 15nH
L471	2413926K30	IDCTR, 390nH
M140	0286427Z01	ANTENNA_NUT
Q21	4802247J01	BFS505
Q22	4805723X02	UMT1
Q51	4802197J95	PBR941
Q70	4880214G02	MMBT3904
Q100	4885593U03	BFG540W
Q150	4880214G02	MMBT3904
Q170	4809939C34	EMB10
Q171	4880048M01	DTC144EKA
Q280	4802245J95	BFS540
Q311	4809579E18	TP0101T
Q312	4809579E18	TP0101T
Q313	4802245J54	UMG5
Q402	4880048M01	DTC144EKA
Q403	4813824A17	MMBT3906
Q410	4802245J54	UMG5
Q440	5180159R01	IMX1
Q470	4805723X02	UMT1
Q471	4802245J54	UMG5
Q472	4805723X02	UMT1
Q481	NOT PLACED	MMBT3906
Q482	NOT PLACED	MMBT3904
Q490	4802245J54	UMG5
Q493	4809579E18	TP0101T
Q494	4802245J54	UMG5
Q520	5180159R01	IMX1
R20	0662057M92	RES, 5.6K
R21	0662057M47	RES, 75
R22	0662057M92	RES, 5.6K
R23	0662057N09	RES, 27K
R24	0662057M76	RES, 1.2K
R25	0662057M92	RES, 5.6K
R40	0662057M74	RES, 1K

Circuit Ref	Motorola Part No.	Description
R51	0662057M43	RES, 51
R52	0662057N01	RES, 12K
R53	0662057N11	RES, 33K
R54	0662057M91	RES, 5.1K
R55	0662057M62	RES, 330
R57	0662057M90	RES, 4.7K
R60	0662057M83	RES, 2.4K
R61	0662057N23	RES, 100K
R62	0662057M86	RES, 3.3K
R63	0662057N13	RES, 39K
R64	0662057N06	RES, 20K
R65	0662057N13	RES, 39K
R66	0662057N06	RES, 20K
R67	0662057N06	RES, 20K
R72	0662057M64	RES, 390
R73	0662057M80	RES, 1.8K
R74	0662057M76	RES, 1.2K
R75	0662057N01	RES, 12K
R76	0662057V04	RES, 12K
R77	0662057U99	RES, 8.2K
R78	0662057M70	RES, 680
R80	0662057M91	RES, 5.1K
R81	0662057M74	RES, 1K
R82	NOT PLACED	RES, 0
R90	0662057M43	RES, 51
R91	0662057M79	RES, 1.6K
R100	0662057M72	RES, 820
R101	0662057M20	RES, 5.6
R102	0662057M72	RES, 820
R103	0662057M85	RES, 3K
R104	0662057A07	RES, 18
R105	0662057M84	RES, 2.7K
R106	0662057M90	RES, 4.7K
R107	NOT PLACED	RES, 300
R110	0662057M67	RES, 510
R111	0662057M80	RES, 1.8K
R120	0662057C55	RES, 150
R121	0662057C55	RES, 150
R150	0680539Z01	RES, 0.1
R151	0662057A15	RES, 39
R152	0662057V27	RES, 100K
R153	0662057V27	RES, 100K
R154	0662057V27	RES, 100K
R155	0662057V27	RES, 100K
R156	0662057M62	RES, 330
R157	0662057M82	RES, 2.2K
R158	0662057M91	RES, 5.1K
R159	0662057B47	RES, 0
R162	0662057M98	RES, 10K
R202	0662057N27	RES, 150K
R205	0662057M50	RES, 100
R206	NOT PLACED	RES, 100
R212	0662057C01	RES, 0
R220	0662057M34	RES, 22
R221	0662057M34	RES, 22
R223	0662057M50	RES, 100
R227	0662057N13	RES, 39K
R230	0662057N08	RES, 24K
R243	0662057M72	RES, 820
R244	0662057M43	RES, 51
R245	0662057M78	RES, 1.5K
R246	0662057N23	RES, 100K
R247	0662057N07	RES, 22K
R253	0662057M38	RES, 33
R254	0662057M50	RES, 100
R255	0662057U91	RES, 3.9K
R261	0662057N07	RES, 22K
R262	0662057M94	RES, 6.8K
R263	0662057M38	RES, 33
R264	0662057M50	RES, 100
R271	0662057M90	RES, 4.7K
R272	0662057M92	RES, 5.6K
R273	0662057M62	RES, 330
R274	0662057M38	RES, 33
R275	0662057M50	RES, 100
R276	NOT PLACED	RES, 1K
R277	0662057B47	RES, 0
R280	0662057M90	RES, 4.7K
R281	0662057M96	RES, 8.2K
R282	0662057M73	RES, 910
R283	0662057M53	RES, 130
R284	0662057M62	RES, 330
R285	0662057M01	RES, 0
R310	0662057N23	RES, 100K
R311	0662057N23	RES, 100K
R312	0662057N06	RES, 20K
R313	0662057M98	RES, 10K
R320	0662057V43	RES, 330K
R321	0662057V35	RES, 200K
R322	0662057N23	RES, 100K
R400	NOT PLACED	RES, 100K
R410	0662057M98	RES, 10K
R411	0662057M72	RES, 820
R412	0662057N23	RES, 100K
R413	0662057N23	RES, 100K
R414	0662057N11	RES, 33K
R415	0662057N11	RES, 33K
R416	0662057N06	RES, 20K
R417	0662057M98	RES, 10K
R418	0662057N23	RES, 100K
R419	0662057M90	RES, 4.7K
R420	0662057V35	RES, 200K
R421	0662057V27	RES, 100K
R422	0662057N23	RES, 100K
R423	0662057N23	RES, 100K
R424	0662057V35	RES, 200K
R425	0662057V27	RES, 100K
R430	0662057N23	RES, 100K
R431	NOT PLACED	RES, 100K
R432	0662057M01	RES, 0
R433	0662057N23	RES, 100K
R434	NOT PLACED	RES, 100K
R440	0662057M90	RES, 4.7K
R441	0662057M90	RES, 4.7K
R442	0662057A33	RES, 220
R443	0662057A27	RES, 120
R445	0662057M90	RES, 4.7K
R446	0662057M98	RES, 10K
R451	0662057N15	RES, 47K
R460	0662057N08	RES, 24K
R462	0662057N08	RES, 24K
R463	0662057N08	RES, 24K
R464	0662057N10	RES, 30K
R469	0662057M26	RES, 10
R470	0662057M82	RES, 2.2K
R471	0662057M82	RES, 2.2K
R472	0662057M70	RES, 680
R473	0662057M70	RES, 680
R474	0662057A37	RES, 330
R475	0662057N29	RES, 180K
R476	0662057N23	RES, 100K
R477	0662057M82	RES, 2.2K
R478	0662057M82	RES, 2.2K
R479	0662057N23	RES, 100K
R480	0662057B47	RES, 0
R481	NOT PLACED	RES, 100K
R482	NOT PLACED	RES, 330K
R483	NOT PLACED	RES, 150K
R484	NOT PLACED	RES, 2.2K
R485	NOT PLACED	RES, 100K
R486	NOT PLACED	RES, 100K
R487	0662057M01	RES, 0
R488	0662057N35	RES, 330K
R489	NOT PLACED	RES, 91K
R490	NOT PLACED	RES, 2.2K
R491	0662057M01	RES, 0
R492	0662057N08	RES, 24K
R493	0662057N35	RES, 330K
R494	0662057V43	RES, 330K
R495	0662057M92	RES, 5.6K
R496	NOT PLACED	RES, 10K
R497	NOT PLACED	RES, 1MEG
R498	NOT PLACED	RES, 47K
R499	NOT PLACED	RES, 270K
R501	0662057M50	RES, 100
R502	0662057M50	RES, 100
R503	0662057M50	RES, 100
R504	0662057M50	RES, 100
R505	0662057M50	RES, 100
R506	0662057M50	RES, 100
R507	0662057M50	RES, 100
R508	0662057N23	RES, 100K
R509	0662057N23	RES, 100K
R510	0662057N35	RES, 330K
R511	0662057N23	RES, 100K
R512	0662057N27	RES, 150K
R513	0662057N23	RES, 100K
R514	0662057N23	RES, 100K
R515	0662057M01	RES, 0
R516	NOT PLACED	RES, 0
R517	NOT PLACED	RES, 0
R518	0662057N31	RES, 220K
R519	0662057N23	RES, 100K
R520	0662057N23	RES, 100K
R521	NOT PLACED	RES, 100K
R522	0662057N23	RES, 100K
R523	0662057M98	RES, 10K
S440	4080710Z22	switch, rotary, 16-channel select
	or 4080710Z13	switch rotary, 4-channel select
S441	4070354A01	SWITCH
S442	4070354A01	SWITCH
S443	4070354A01	SWITCH
S444	1880619Z02	SWITCH
SH1	2686421Z01	SHIELD
SH40	2686419Z01	SHIELD
SH50	2686423Z01	SHIELD
SH52	2686424Z01	SHIELD
SH100	2686418Z01	SHIELD
SH200	2686424Z01	SHIELD
SH201	2686423Z01	SHIELD
SH250	2686425Z01	SHIELD
SH251	2686425Z01	SHIELD
SH253	2686422Z01	SHIELD
SH400	2686420Z01	SHIELD
SH401	2686420Z01	SHIELD
T41	2580541Z02	XFMR
T42	2580541Z02	XFMR
U51	5186144B01	SA616
U52	5109522E10	TC7W04F
U110	0186438Z03	RA07M4047M_UHF
U150	5113818A01	LM2904
U151	2484657R01	57R01

Circuit Ref	Motorola Part No.	Description
U201*	5185963A27	63A27
U251	5105750U54	50U54
U310	5102478J01	TK71750S
U320	5185963A55	LP2986
U330	5102479J01	TK71730S
U401*	5102226J56	MC68HC11FL0
U402*	5102463J64	X25128-2.7
U403	NOT PLACED	SRM2B256
U404*	5102480J01	AT49LV001N_70VI
U451	5185130C53	30C53
U480	NOT PLACED	LM2904
U490	5108858K99	TDA8541
U510	5113818A01	LM2904
U511	4802245J54	UMG5
VR110	4813830A86	MM3Z3V9T1
VR301	4813830A33	MMBZ5250B
VR302	4813830A33	MMBZ5250B
VR471	4813830A18	MMBZ5235B
VR472	4813830A09	MMBZ5226B
VR473	4813830A33	MMBZ5250B
VR474	4813830A33	MMBZ5250B
VR475	4880140L20	MMBZ5245B
Y51	4802245J84	TSS2_44_395MHZ
Y70	9186145B02	45B02
Y201*	4880114R06	14R06
Y202	NOT PLACED	45J68

* Motorola Depot Servicing only

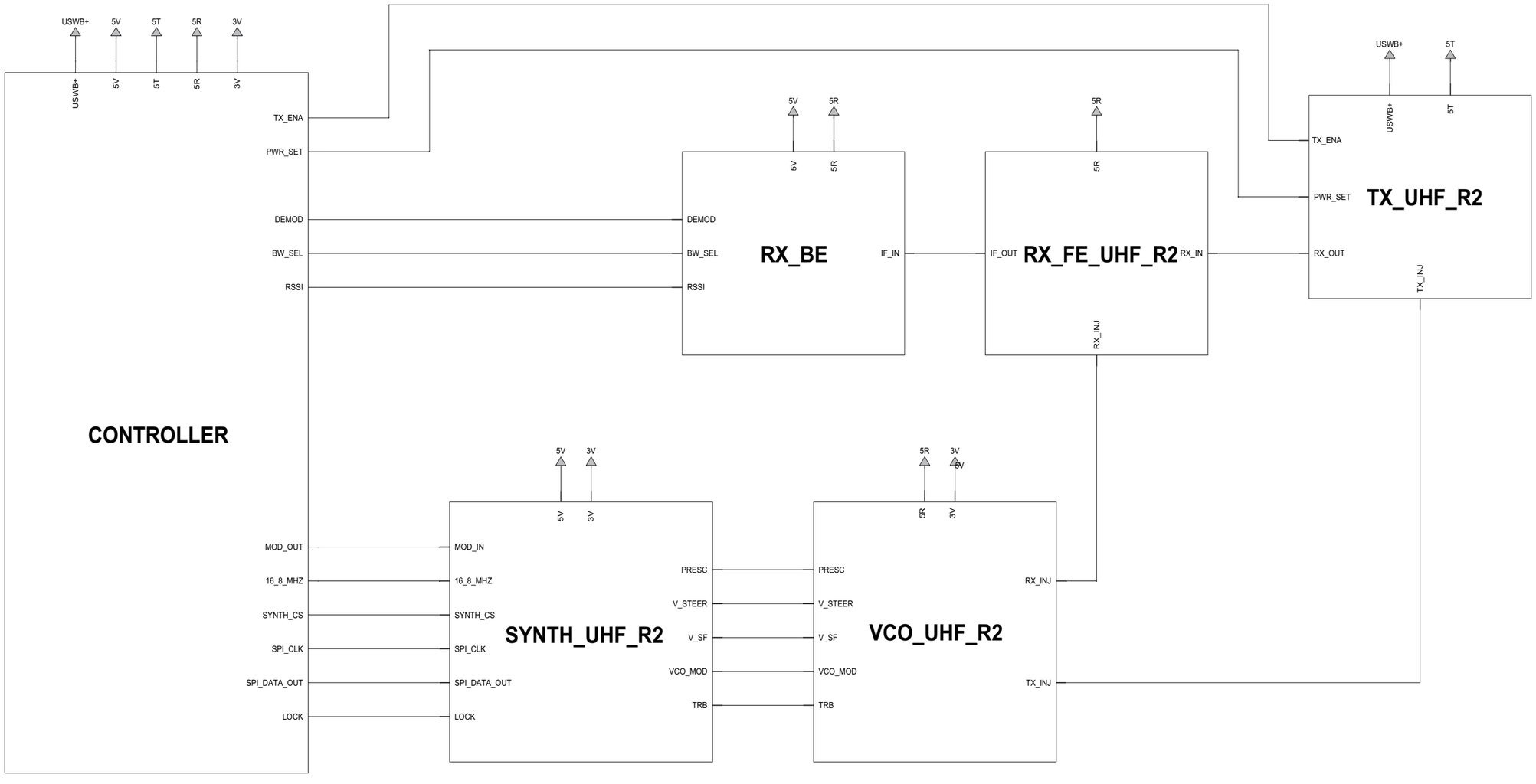


Figure 13-15. UHF (403–440 MHz) Radio Circuit Block Diagram (8416205H02-C/03-D)

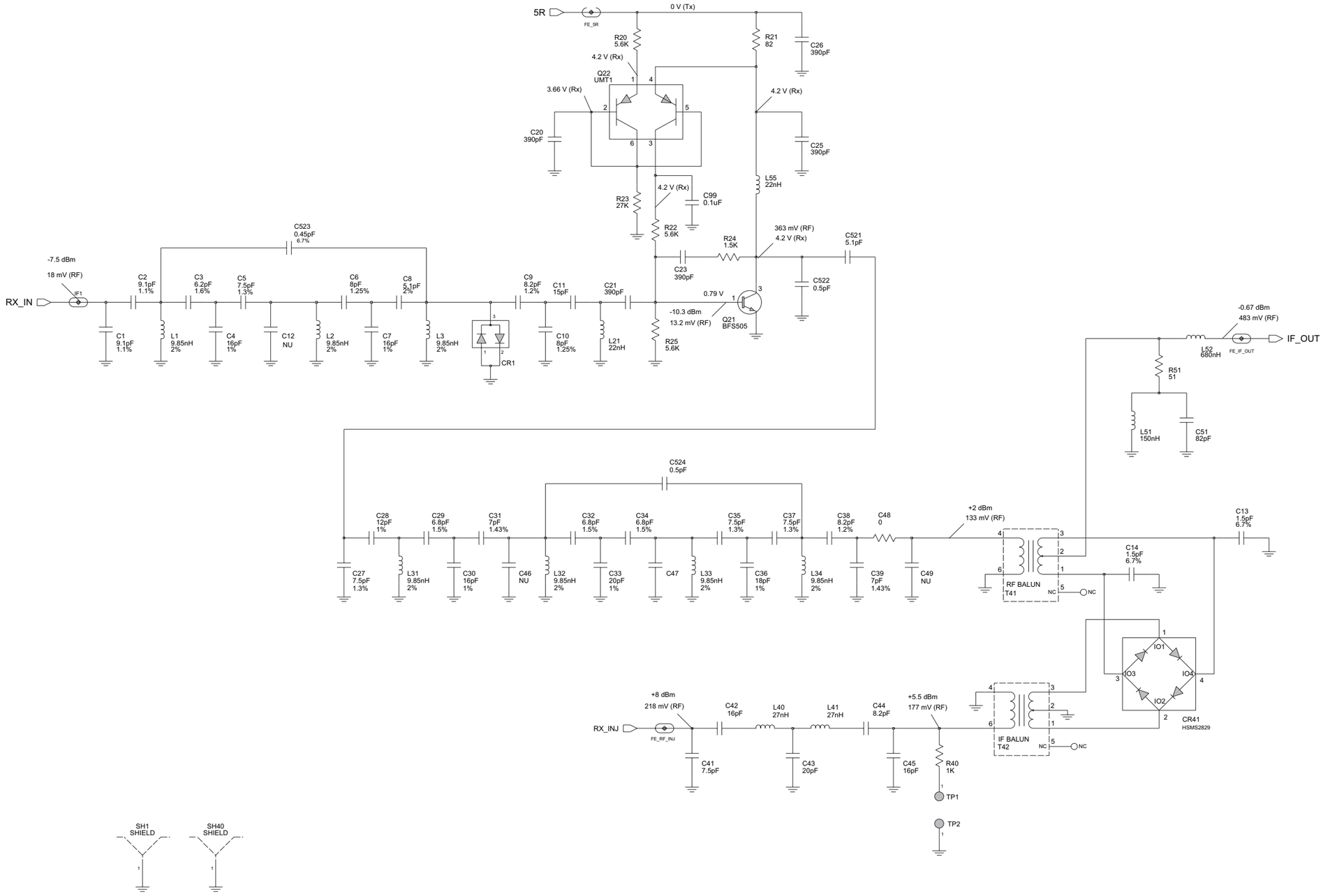


Figure 13-16. UHF (403–440 MHz) Receiver Front End Schematic Diagram (8416205H02-C/03-D)

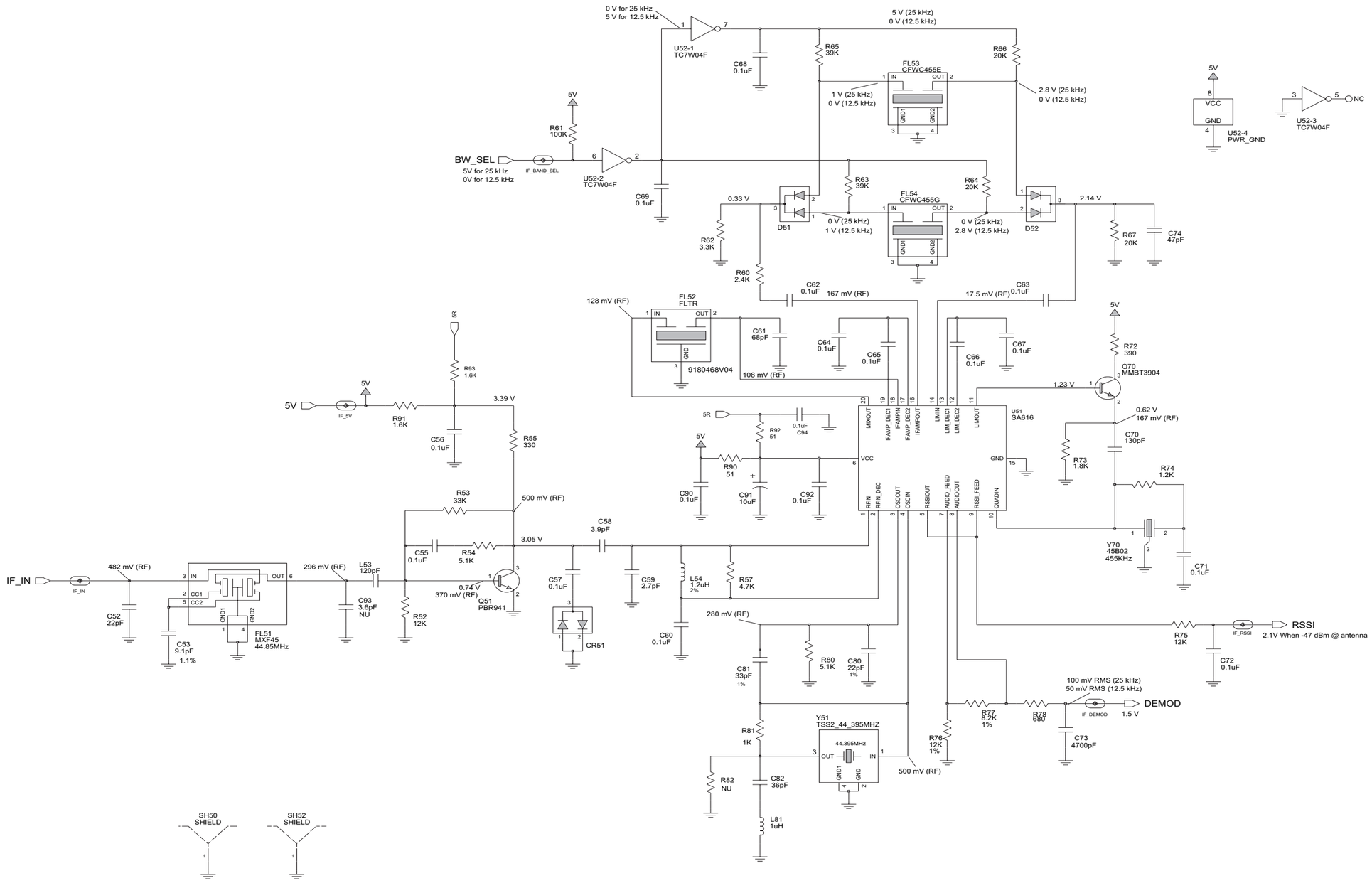
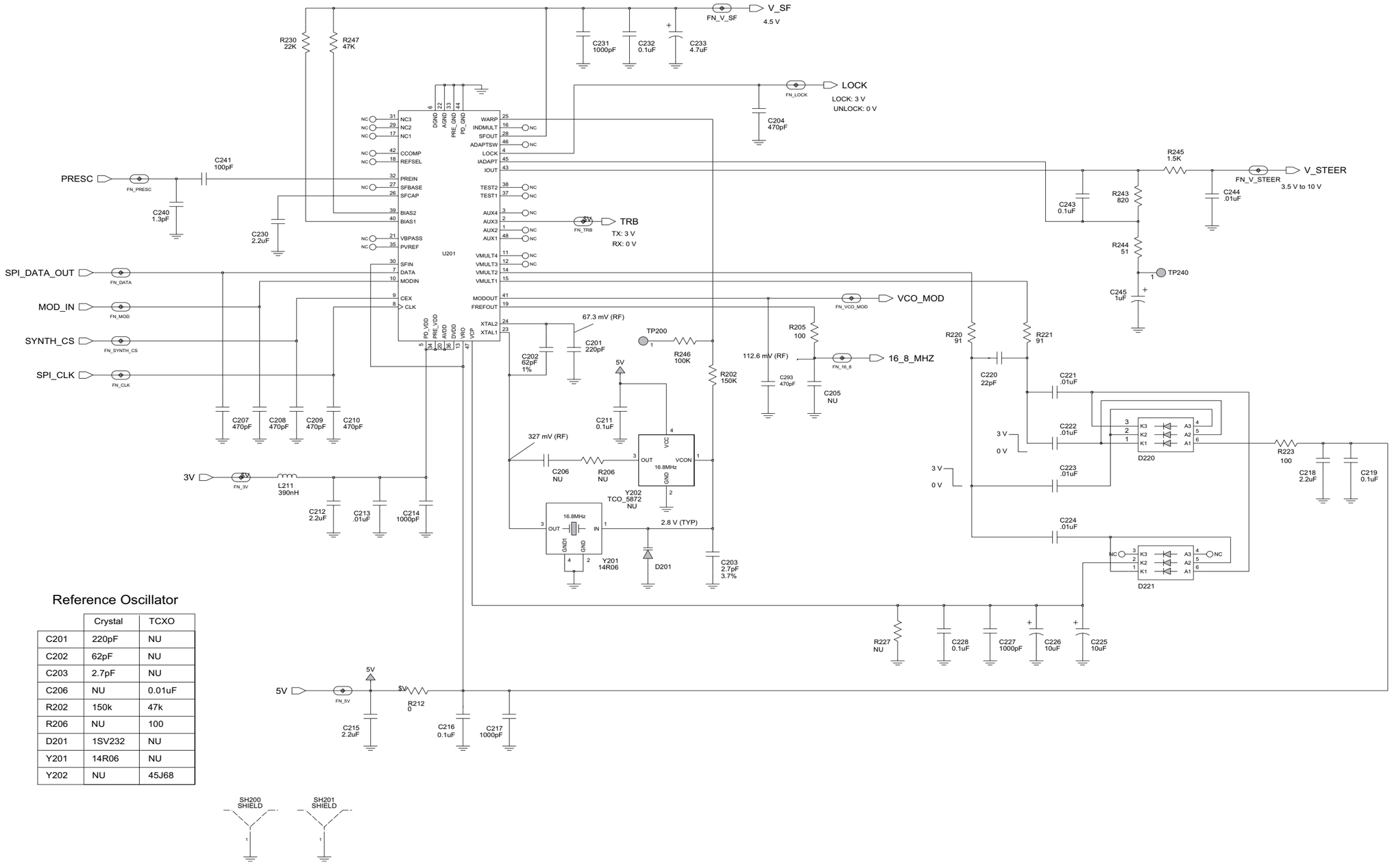


Figure 13-17. UHF (403–440 MHz) Receiver Back End Schematic Diagram (8416205H02-C/03-D)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 13-18. UHF (403–440 MHz) Synthesizer Schematic Diagram (8416205H02-C/03-D)

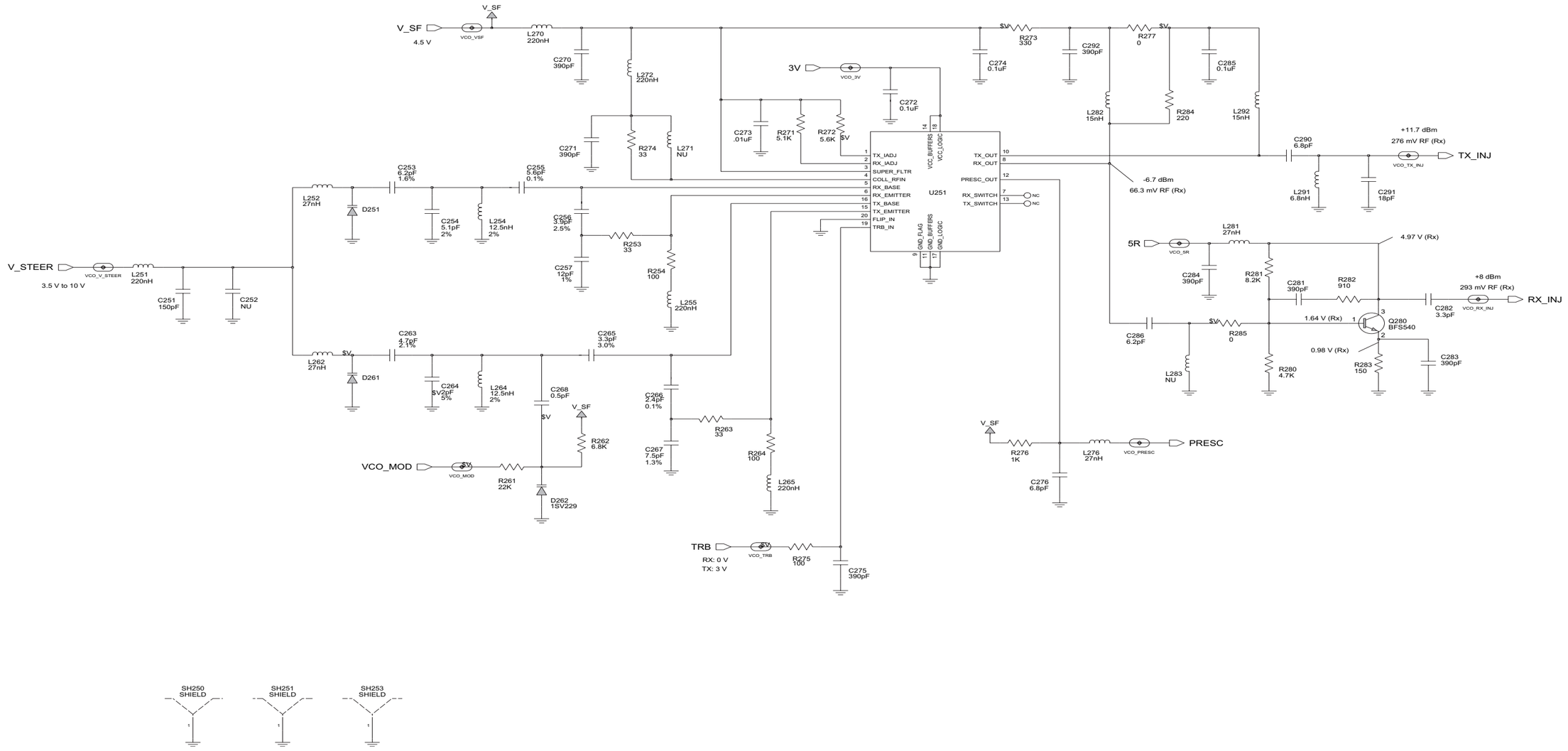


Figure 13-19. UHF (403–440 MHz) Voltage Controlled Oscillator Schematic Diagram (8416205H02-C/03-D)

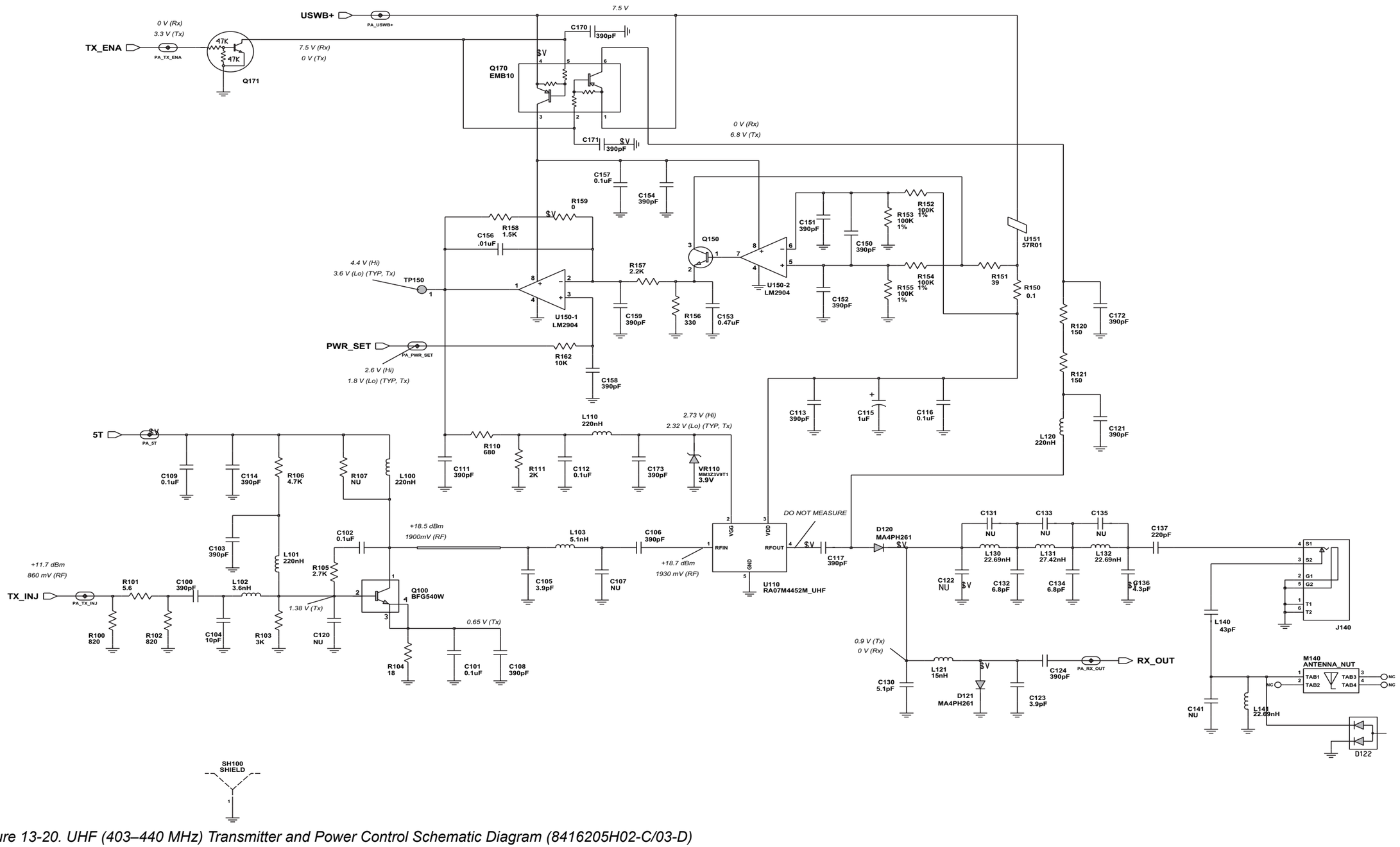


Figure 13-20. UHF (403–440 MHz) Transmitter and Power Control Schematic Diagram (8416205H02-C/03-D)

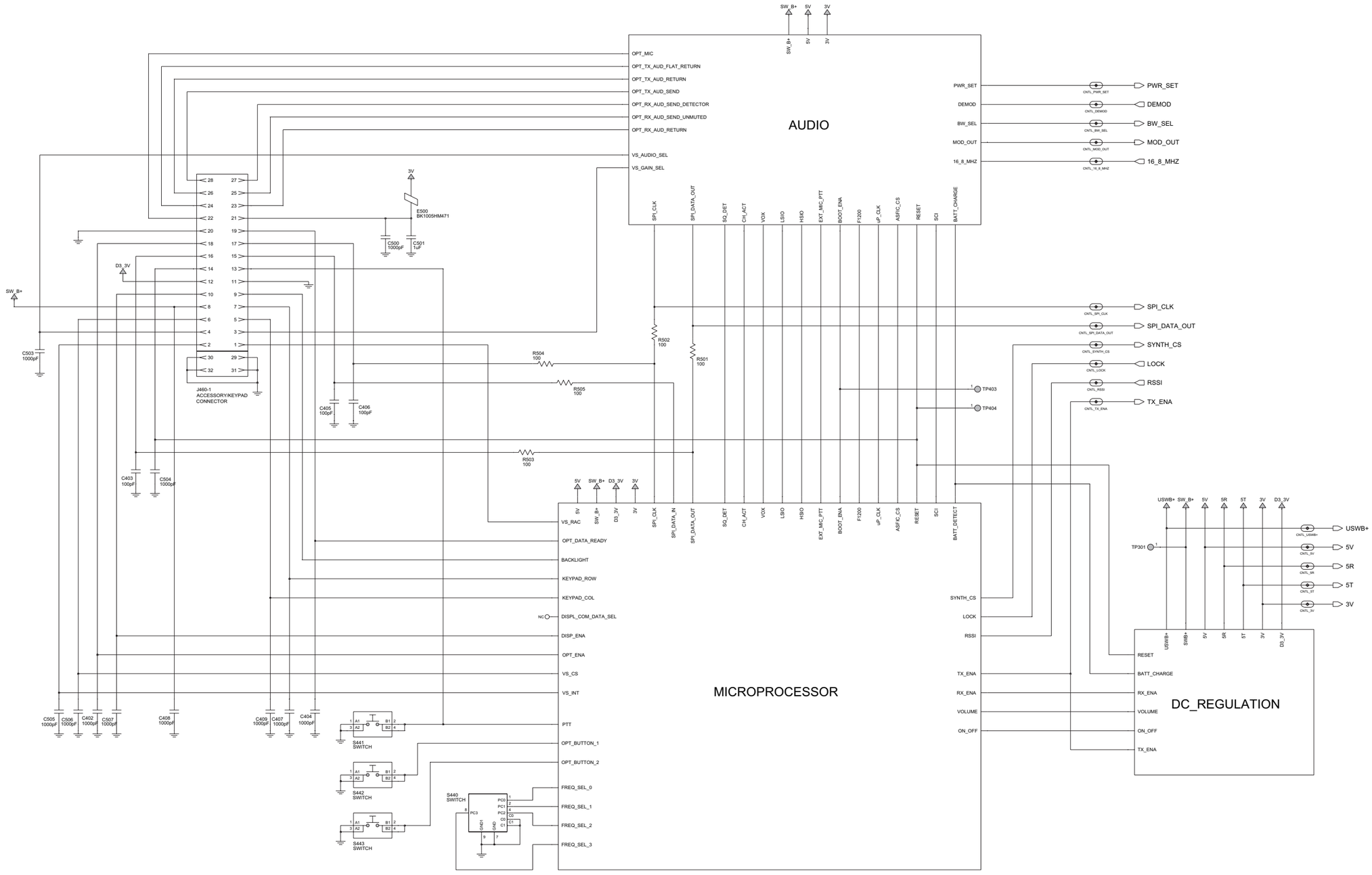


Figure 13-21. UHF (403–440 MHz) Controller Interconnect Schematic Diagram (8416205H02-C/03-D)

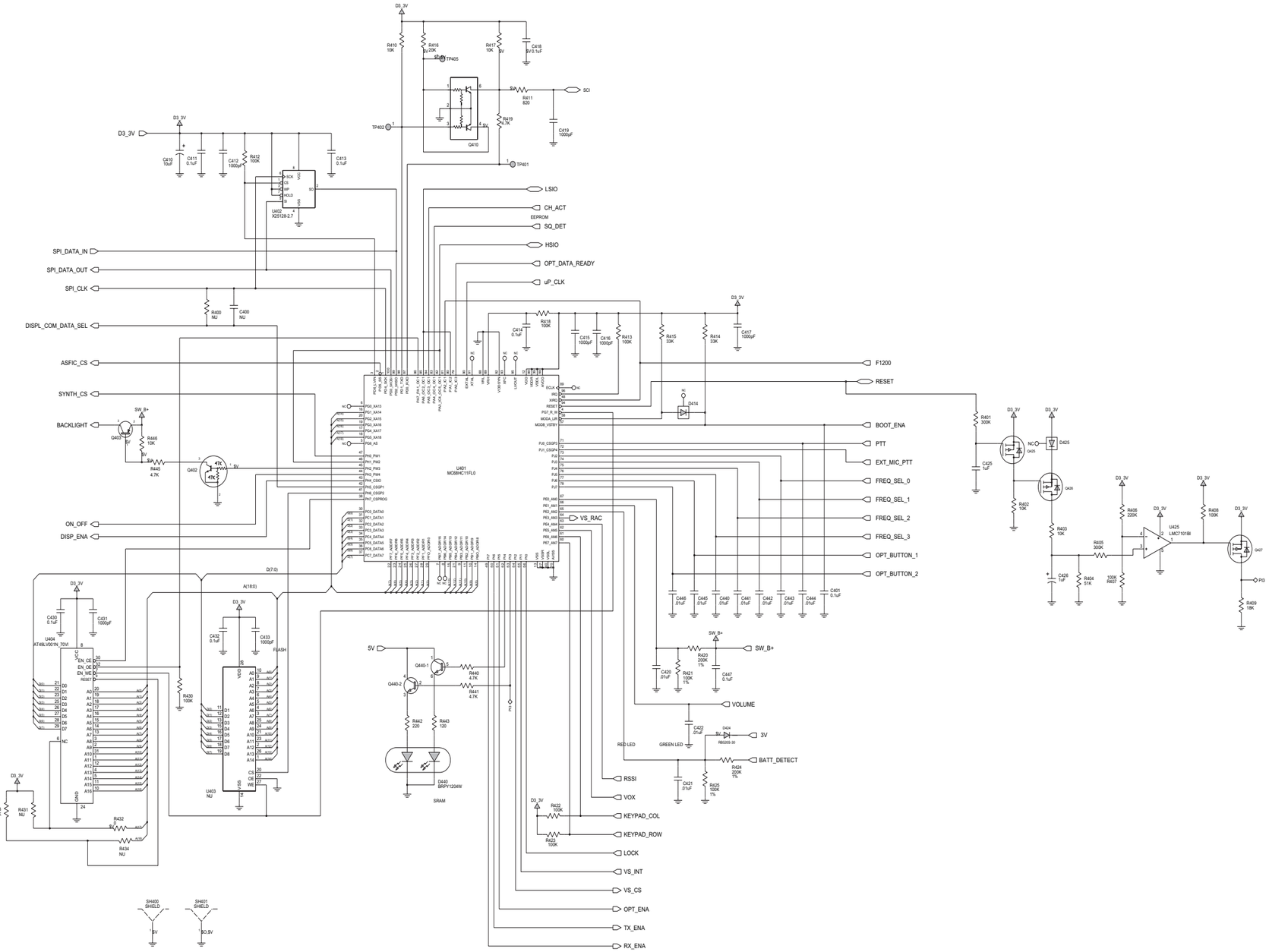


Figure 13-22. UHF (403–440 MHz) Microprocessor Circuitry Schematic Diagram (8416205H02-C/03-D)

	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

Figure 13-23. UHF (403–440 MHz) Audio Circuitry Schematic Diagram (8416205H02-C/03-D)

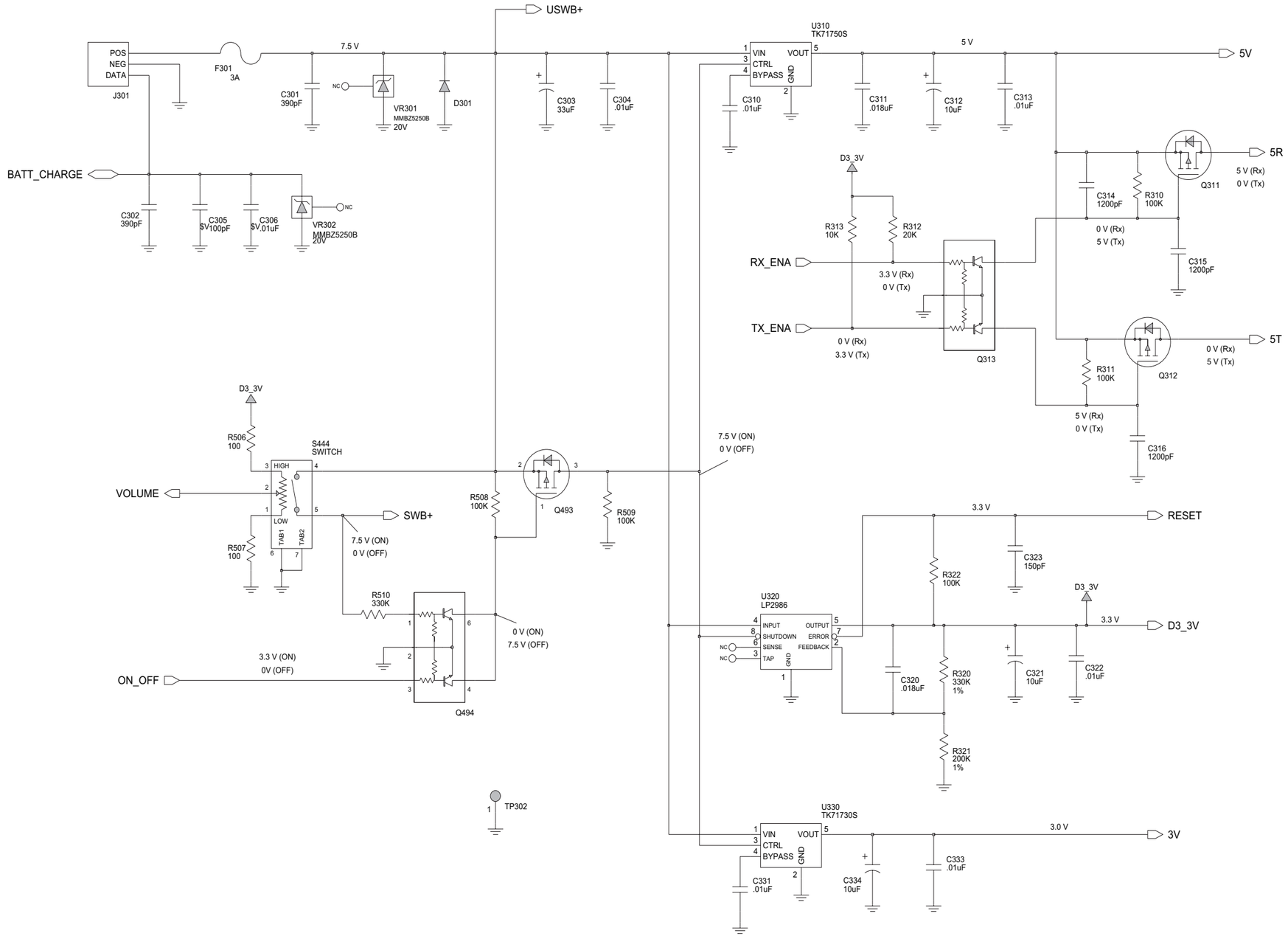


Figure 13-24. UHF (403–440 MHz) DC Regulation Schematic Diagram (8416205H02-C/03-D)

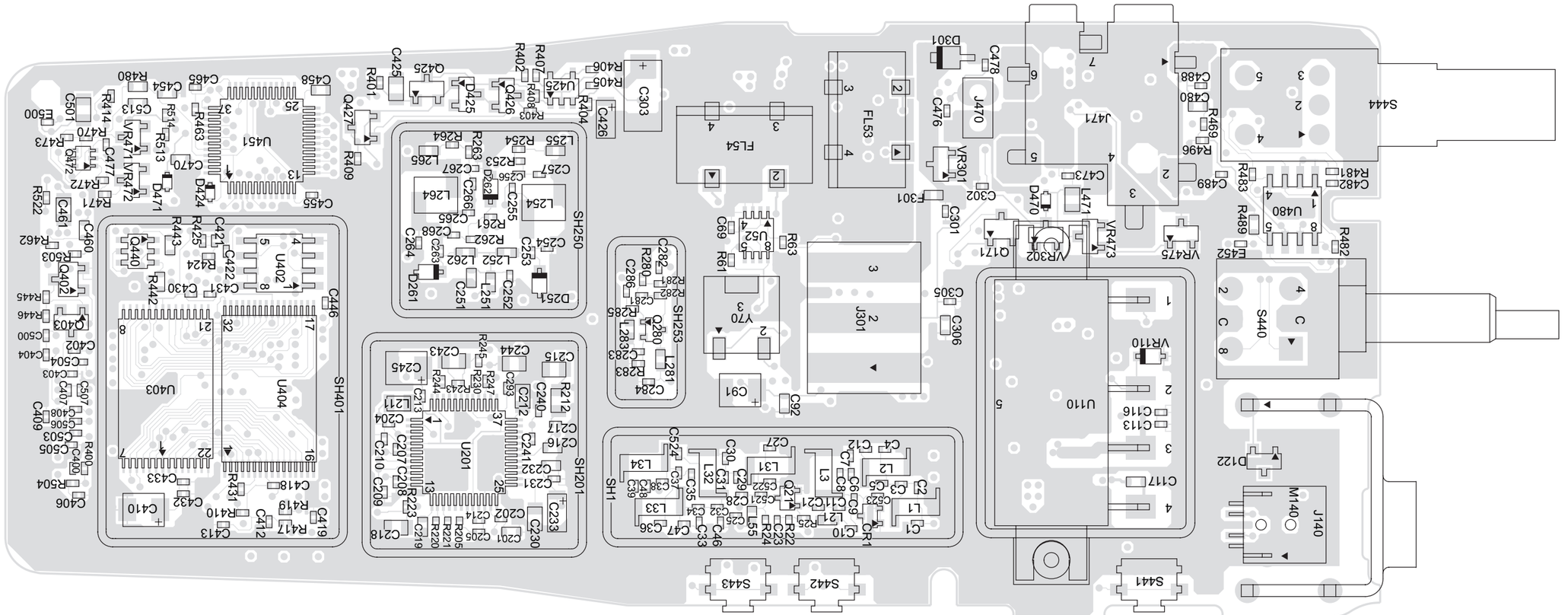


Figure 13-25. UHF (403–440 MHz) Board Component Side View (8416205H02-C/03-D)

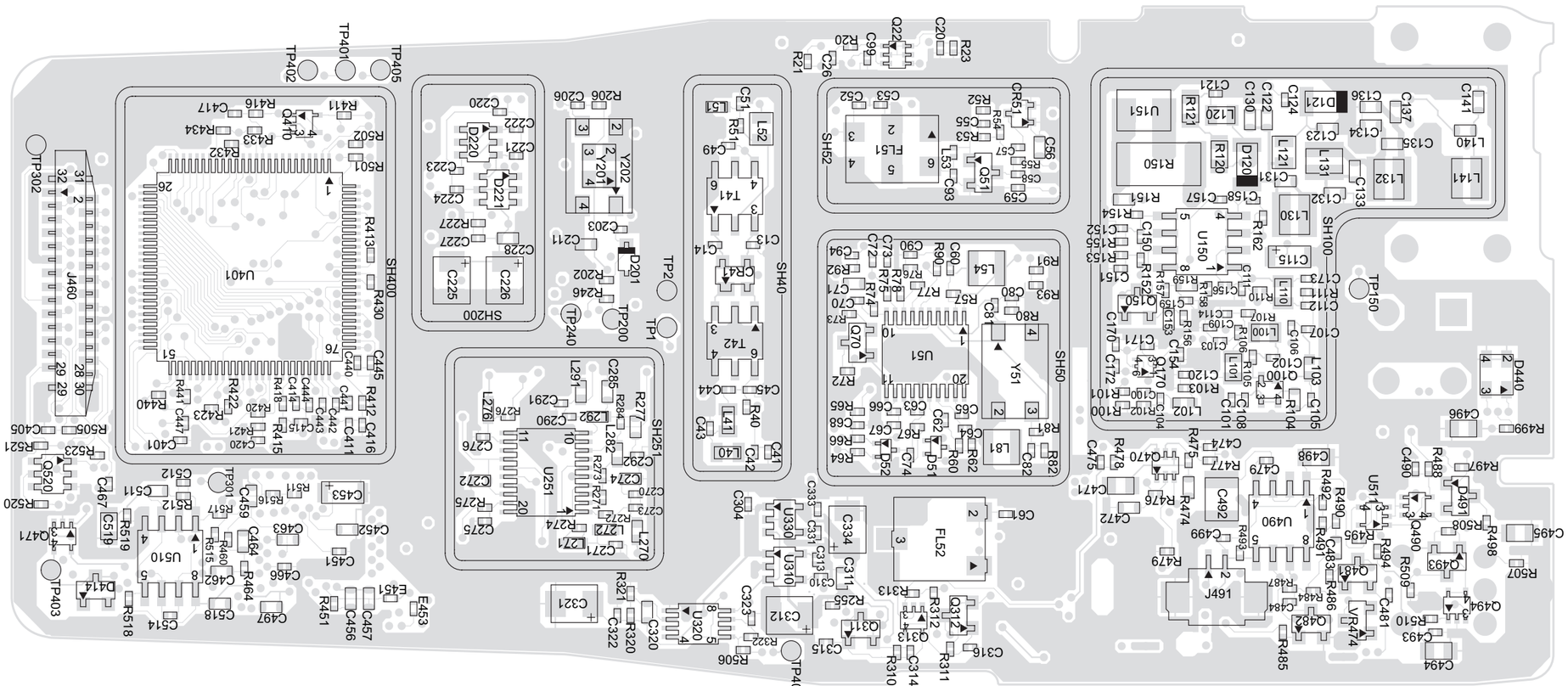


Figure 13-26. UHF (403–440 MHz) Board Solder Side View (8416205H02-C/03-D)

UHF (403–440 MHz) Radio Parts List (8416205H02-C/03-D)

Circuit Ref	Motorola Part No.	Description
C1	2115153H37	CAP, 15.0pF 50V
C2	2115153H39	CAP, 18.0pF 50V
C3	2115153H09	CAP, 1.8pF 50V
C4	NOT PLACED	64AM DUMMY PART NUMBER
C5	0613952R66	RES 0.0 OHM
C6	2115153H09	CAP, 1.8pF 50V
C7	NOT PLACED	64AM DUMMY PART NUMBER
C8	0613952R66	RES 0.0 OHM
C9	2115153H39	CAP, 18.0pF 50V
C10	2115153H36	CAP, 12.0pF 50V
C11	2115153H40	CAP, 20.0pF 50V
C12	2115153H27	CAP, 10.0pF 50V
C13	2115153H12	CAP, 2.4pF 50V
C14	2115153H12	CAP, 2.4pF 50V
C20	2113945A04	CAP, 390PF 50V
C21	2113945A04	CAP, 390PF 50V
C23	2113945A04	CAP, 390PF 50V
C25	2113945A04	CAP, 390PF 50V
C26	2113945A04	CAP, 390PF 50V
C27	2115153H26	CAP, 9.1pF 50V
C28	2115153H37	CAP, 15.0pF 50V
C29	2115153H25	CAP, 8.2pF 50V
C30	2115153H41	CAP, 22pF 50V
C31	2115153H26	CAP, 9.1pF 50V
C32	2115153H24	CAP, 7.5pF 50V
C33	2115153H39	CAP, 18.0pF 50V
C34	2115153H22	CAP, 6.2pF 50V
C35	2115153H35	CAP, 11.0pF 50V
C36	2115153H38	CAP, 16.0pF 50V
C37	2115153H22	CAP, 6.2pF 50V
C38	2115153H38	CAP, 16.0pF 50V
C39	2115153H35	CAP, 11.0pF 50V
C41	2115153H37	CAP, 15.0pF 50V
C42	2115153H27	CAP, 10.0pF 50V
C43	2115153H44	CAP, 30.0pF 50V
C44	2115153H27	CAP, 10.0pF 50V
C45	2115153H41	CAP, 22pF 50V
C46	NOT PLACED	64AM DUMMY PART NUMBER
C47	NOT PLACED	64AM DUMMY PART NUMBER
C48	0613952R66	RES 0.0 OHM
C49	NOT PLACED	64AM DUMMY PART NUMBER
C51	2113944A38	CAP,82.0PF 50V
C52	2115153H39	CAP, 18.0pF 50V
C53	2115153H26	CAP, 9.1pF 50V
C55	2113946K02	CAP, 0.10UF 16V
C56	2113945C31	CAP, 0.1UF 50V
C57	2113946K02	CAP, 0.10UF 16V
C58	2113944A15	CAP,3.9PF 50V
C59	2113944A11	CAP,2.7PF 50V
C60	2113946K02	CAP, 0.10UF 16V
C61	2113944A36	CAP,68.0PF 50V
C62	2113946K02	CAP, 0.10UF 16V
C63	2113946K02	CAP, 0.10UF 16V
C64	2113946K02	CAP, 0.10UF 16V
C65	2113946K02	CAP, 0.10UF 16V
C66	2113946K02	CAP, 0.10UF 16V
C67	2113946K02	CAP, 0.10UF 16V
C68	2113946K02	CAP, 0.10UF 16V
C69	2113946K02	CAP, 0.10UF 16V
C70	2113944A87	CAP,130PF 50V
C71	2113945C31	CAP, 0.1UF 50V
C72	2113946K02	CAP, 0.10UF 16V
C73	2113945A13	CAP, 4700PF 50V
C74	2113944A33	CAP,47.0PF 50V
C80	2115153H41	CAP, 22pF 50V
C81	2115153H45	CAP, 33.0pF 50V
C82	2115153H45	CAP, 33.0pF 50V
C90	2113946K02	CAP, 0.10UF 16V
C91	2313960D07	CAP, 10 UF16V
C92	2113945C31	CAP, 0.1UF 50V
C93	NOT PLACED	64AM DUMMY PART NUMBER
C99	2113946K02	CAP, 0.10UF 16V
C100	2113945A04	CAP, 390PF 50V
C101	2113946K02	CAP, 0.10UF 16V
C102	2113946K02	CAP, 0.10UF 16V
C103	2113945A04	CAP, 390PF 50V
C104	2113944A25	CAP,10.0PF 50V
C105	2113944A63	CAP,1PF 50V
C106	2113945A04	CAP, 390PF 50V
C107	2113944A12	CAP,3.0PF 50V
C108	2113945A04	CAP, 390PF 50V
C109	2113946K02	CAP, 0.10UF 16V
C111	2113945A04	CAP, 390PF 50V
C112	2113946K02	CAP, 0.10UF 16V
C113	2113945A04	CAP, 390PF 50V
C114	2113945A04	CAP, 390PF 50V
C115	2313960B01	CAP, 1.0 UF 16V
C116	2113946K02	CAP, 0.10UF 16V
C117	2113944C05	CAP, 390.0PF 50V
C120	NOT PLACED	64AM DUMMY PART NUMBER
C121	2113945A04	CAP, 390PF 50V
C122	2113944C76	CAP, 9.1PF 50V
C123	2113944C71	CAP, 5.6PF 50V
C124	2113945A01	CAP, 220PF 50V
C130	NOT PLACED	64AM DUMMY PART NUMBER
C131	NOT PLACED	64AM DUMMY PART NUMBER
C132	2113944C30	CAP, 10.0PF 50V
C133	NOT PLACED	64AM DUMMY PART NUMBER
C134	2113944C75	CAP, 8.2PF 50V
C135	NOT PLACED	64AM DUMMY PART NUMBER
C136	2113944C21	CAP, 4.3PF 50V
C137	2113944C02	CAP, 220.0PF 50V
C141	NOT PLACED	64AM DUMMY PART NUMBER
C150	2113945A04	CAP, 390PF 50V
C151	2113945A04	CAP, 390PF 50V
C152	2113945A04	CAP, 390PF 50V
C153	2113946L04	CAP, 0.47UF 16V
C154	2113945A04	CAP, 390PF 50V
C156	2113945B02	CAP, 10,000PF 25V
C157	2113946K02	CAP, 0.10UF 16V
C158	2113945A04	CAP, 390PF 50V
C159	2113945A04	CAP, 390PF 50V
C170	2113945A04	CAP, 390PF 50V
C171	2113945A04	CAP, 390PF 50V
C172	2113945A04	CAP, 390PF 50V
C173	2113945A04	CAP, 390PF 50V
C201	2113944C02	CAP, 220.0PF 50V
C202	2115153H52	CAP, 62.0pF 50V
C203	2115153H13	CAP, 2.7pF 50V
C204	2113945A05	CAP, 470PF 50V
C205	NOT PLACED	64AM DUMMY PART NUMBER
C206	NOT PLACED	64AM DUMMY PART NUMBER
C207	2113945A05	CAP, 470PF 50V
C208	2113945A05	CAP, 470PF 50V
C209	2113945A05	CAP, 470PF 50V
C210	2113945A05	CAP, 470PF 50V
C211	2113945C31	CAP, 0.1UF 50V
C212	2113946N03	CAP, 2.2UF 16V
C213	2113945B02	CAP, 10,000PF 25V
C214	2113945A09	CAP, 1000PF 50V
C215	2113946N03	CAP, 2.2UF 16V
C216	2113945C31	CAP, 0.1UF 50V
C217	2113945A09	CAP, 1000PF 50V
C218	2113946N03	CAP, 2.2UF 16V
C219	2113945C31	CAP, 0.1UF 50V
C220	2113944A29	CAP,22.0PF 50V
C221	2113945B02	CAP, 10,000PF 25V
C222	2113945B02	CAP, 10,000PF 25V
C223	2113945B02	CAP, 10,000PF 25V
C224	2113945B02	CAP, 10,000PF 25V
C225	2313960D07	CAP, 10 UF16V
C226	2313960D07	CAP, 10 UF16V
C227	2113945A09	CAP, 1000PF 50V
C228	2113945C31	CAP, 0.1UF 50V
C230	2113946N03	CAP, 2.2UF 16V
C231	2113945A09	CAP, 1000PF 50V
C232	2113945C31	CAP, 0.1UF 50V
C233	2313960B30	CAP, 4.7 UF10V
C240	2113944A03	CAP,1.3PF 50V
C241	2113944A40	CAP,100.0PF 50V
C243	0886641Z01	CAP, 1UF 16V
C244	0888600M25	CAP, 10nF 16V
C245	2313960C26	CAP, 1.0 UF35V
C251	0888600M03	CAP, 0.15nF 16V
C252	NOT PLACED	64AM DUMMY PART NUMBER
C253	2115153H22	CAP, 6.2pF 50V
C254	2115153H24	CAP, 7.5pF 50V
C255	2115153H21	CAP, 5.6pF 50V
C256	2115153H16	CAP, 3.6pF 50V
C257	2115153H27	CAP, 10.0pF 50V
C263	2115153H29	CAP, 5.0pF 50V
C264	2115153H15	CAP, 3.3pF 50V
C265	2115153H15	CAP, 3.3pF 50V
C266	2115153H15	CAP, 3.3pF 50V
C267	2115153H23	CAP, 6.8pF 50V
C268	2115153H01	CAP, 0.5pF 50V
C270	2113945A04	CAP, 390PF 50V
C271	2113945A04	CAP, 390PF 50V
C272	2113945C31	CAP, 0.1UF 50V
C273	2113945B02	CAP, 10,000PF 25V
C274	2113945C31	CAP, 0.1UF 50V
C275	2113945A04	CAP, 390PF 50V
C276	2113944A15	CAP,3.9PF 50V
C281	2113945A04	CAP, 390PF 50V
C282	2115153H16	CAP, 3.6pF 50V
C283	2113945A04	CAP, 390PF 50V
C284	2113945A04	CAP, 390PF 50V
C285	2113945C31	CAP, 0.1UF 50V
C286	2113944A23	CAP,8.2PF 50V
C290	2113944A21	CAP,6.8PF 50V
C291	2113944A78	CAP,13PF 50V
C292	2113945A04	CAP, 390PF 50V
C293	2113945A05	CAP, 470PF 50V
C301	2113945A04	CAP, 390PF 50V
C302	2113945A04	CAP, 390PF 50V
C303	2313960F04	CAP, 33 UF16V
C304	2113945B02	CAP, 10,000PF 25V

Circuit Ref	Motorola Part No.	Description
C305	2113944A40	CAP,100.0PF 50V
C306	2113945L49	CAP, 0.01UF 50V
C310	2113945B02	CAP, 10,000PF 25V
C311	2113945C21	CAP, 0.018UF 25V
C312	2313960D07	CAP, 10 UF16V
C313	2113945B02	CAP, 10,000PF 25V
C314	2113945A60	CAP, 1200PF 50V
C315	2113945A60	CAP, 1200PF 50V
C316	2113945A60	CAP, 1200PF 50V
C320	2113945C21	CAP, 0.018UF 25V
C321	2313960D07	CAP, 10 UF16V
C322	2113945B02	CAP, 10,000PF 25V
C323	2113944A42	CAP,150.0PF 50V
C331	2113945B02	CAP, 10,000PF 25V
C333	2113945B02	CAP, 10,000PF 25V
C334	2313960D07	CAP, 10 UF16V
C400	NOT PLACED	64AM DUMMY PART NUMBER
C401	2113946K02	CAP, 0.10UF 16V
C402	2113945A09	CAP, 1000PF 50V
C403	2113944A40	CAP,100.0PF 50V
C404	2113945A09	CAP, 1000PF 50V
C405	2113944A40	CAP,100.0PF 50V
C406	2113944A40	CAP,100.0PF 50V
C407	2113945A09	CAP, 1000PF 50V
C408	2113945A09	CAP, 1000PF 50V
C409	2113945A09	CAP, 1000PF 50V
C410	2313960D07	CAP, 10 UF16V
C411	2113946K02	CAP, 0.10UF 16V
C412	2113945A09	CAP, 1000PF 50V
C413	2113946K02	CAP, 0.10UF 16V
C414	2113946K02	CAP, 0.10UF 16V
C415	2113945A09	CAP, 1000PF 50V
C416	2113945A09	CAP, 1000PF 50V
C417	2113945A09	CAP, 1000PF 50V
C418	2113946K02	CAP, 0.10UF 16V
C419	2113945A09	CAP, 1000PF 50V
C420	2113945B02	CAP, 10,000PF 25V
C421	2113945B02	CAP, 10,000PF 25V
C422	2113945B02	CAP, 10,000PF 25V
C425	2113946E02	CAP, 1.0 UF 10V
C426	2313960B01	CAP, 1.0 UF 16V
C430	2113946K02	CAP, 0.10UF 16V
C431	2113945A09	CAP, 1000PF 50V
C432	2113946K02	CAP, 0.10UF 16V
C433	2113945A09	CAP, 1000PF 50V
C440	2113945B02	CAP, 10,000PF 25V
C441	2113945B02	CAP, 10,000PF 25V
C442	2113945B02	CAP, 10,000PF 25V
C443	2113945B02	CAP, 10,000PF 25V
C444	2113945B02	CAP, 10,000PF 25V
C445	2113945B02	CAP, 10,000PF 25V
C446	2113945B02	CAP, 10,000PF 25V
C447	2113946K02	CAP, 0.10UF 16V
C451	2113946K02	CAP, 0.10UF 16V
C452	2113945C31	CAP, 0.1UF 50V
C453	2313960B30	CAP, 4.7 UF10V
C454	2113945C31	CAP, 0.1UF 50V
C455	2113945B04	CAP, 0.022UF 25V
C456	2113945C31	CAP, 0.1UF 50V
C457	2113945C31	CAP, 0.1UF 50V
C458	2113945C31	CAP, 0.1UF 50V
C459	2113945C31	CAP, 0.1UF 50V
C460	2113945C31	CAP, 0.1UF 50V
C461	2113946F03	CAP, 4.7 UF 10V
C462	2113945C31	CAP, 0.1UF 50V
C463	2113945C31	CAP, 0.1UF 50V
C464	2113945C31	CAP, 0.1UF 50V
C465	2113945A09	CAP, 1000PF 50V
C466	NOT PLACED	64AM DUMMY PART NUMBER
C467	2113945A60	CAP, 1200PF 50V
C470	2113945C31	CAP, 0.1UF 50V
C471	2113946N03	CAP, 2.2UF 16V
C472	2113945C31	CAP, 0.1UF 50V
C473	2113944A42	CAP,150.0PF 50V
C474	2113944A42	CAP,150.0PF 50V
C475	2113945B04	CAP, 0.022UF 25V
C476	2113945B04	CAP, 0.022UF 25V
C477	2113946K02	CAP, 0.10UF 16V
C478	2113944A42	CAP,150.0PF 50V
C479	2113944A42	CAP,150.0PF 50V
C480	2113945C31	CAP, 0.1UF 50V
C481	NOT PLACED	64AM DUMMY PART NUMBER
C482	NOT PLACED	64AM DUMMY PART NUMBER
C483	2113946C02	CAP, 0.22UF 10V
C484	NOT PLACED	64AM DUMMY PART NUMBER
C488	2113945A05	CAP, 470PF 50V
C489	2113945A05	CAP, 470PF 50V
C490	2113945A05	CAP, 470PF 50V
C492	2113955E37	CAP, 10UF 16V
C493	2113945A09	CAP, 1000PF 50V
C494	2113946N03	CAP, 2.2UF 16V
C495	2113946N02	CAP, 1.0UF 16V
C496	2113946N02	CAP, 1.0UF 16V
C497	2113945C31	CAP, 0.1UF 50V
C498	2113946N02	CAP, 1.0UF 16V
C499	2113944A32	CAP,39.0PF 50V
C500	2113945A09	CAP, 1000PF 50V
C501	2113946N02	CAP, 1.0UF 16V
C503	2113945A09	CAP, 1000PF 50V
C504	2113945A09	CAP, 1000PF 50V
C505	2113945A09	CAP, 1000PF 50V
C506	2113945A09	CAP, 1000PF 50V
C507	2113945A09	CAP, 1000PF 50V
C511	2113944C02	CAP, 220.0PF 50V
C512	2113944A21	CAP,6.8PF 50V
C513	2113944C02	CAP, 220.0PF 50V
C514	2113944A79	CAP,16PF 50V
C518	2113945C31	CAP, 0.1UF 50V
C519	2113946N02	CAP, 1.0UF 16V
C521	2115153H15	CAP, 3.3pF 50V
C522	2115153H11	CAP, 2.2pF 50V
C523	2186463Z04	CAP, 0.55pF
C524	2186463Z05	CAP, 0.60pF
CR1	4813974A19	DIODE SCHOTTKY
CR41	4815923H01	SCHOTTKY DIODE
CR51	4813974A19	DIODE SCHOTTKY
D51	4815047H01	DIODE, 35V
D52	4815047H01	DIODE, 35V
D120	4880973Z02	PIN DIODE
D121	4880973Z02	PIN DIODE
D122	4813978C06	DIODE DUAL 75V
D201	4815072H01	DIODE,VCTR,1SV232,30V
D220	4815011H01	DIODE, 300MA,80V
D221	4815011H01	DIODE, 300MA,80V
D251	4885055Y01	DIODE VARACTOR
D261	4885055Y01	DIODE VARACTOR
D262	4885055Y01	DIODE VARACTOR
D301	4815713H01	DIODE SCHOTTKY 1A 20V
D414	4805129M41	SOT SMBD1022
D424	4809924D29	DIODE, 50MA,30V,
D425	4805129M41	SOT SMBD1023
D440	4805729G49	DIODE RED/YEL
D470	4809924D29	DIODE, 50MA,30V,
D471	4809924D29	DIODE, 50MA,30V,
D491	NOT PLACED	64AM DUMMY PART NUMBER
E451	2480640Z01	FERRITE BEAD
E452	2480640Z01	FERRITE BEAD
E453	2480640Z01	FERRITE BEAD
E500	2480640Z01	FERRITE BEAD
F301	6515076H01	FUSE, 3A 24V
FL51	9186801Z01	OSC,XTAL,,44.85MHZ
FL52	9180468V04	4 ELEMENT CER FLTR
FL53	9115811H03	6 ELEMENT CER FLTR
FL54	9115811H01	6 ELEMENT CER FLTR
J140	0986428Z02	CONNECTOR, RF
J301	0986565Z02	CONNECTOR CONTACT BATTERY
J460	NOT PLACED	64AM DUMMY PART NUMBER
J470	0985818A02	CONNECTOR, MICROPHONE
J471	0980683Z03	AUDIO JACK
J491	2815162H01	HEADER SMT HORZ MOUNT
L1	2415428H08	AIR WOUND INDUCTOR
L2	2415428H08	AIR WOUND INDUCTOR
L3	2415428H08	AIR WOUND INDUCTOR
L21	2414017N17	IND, 27.0 NH
L31	2415428H08	AIR WOUND INDUCTOR
L32	2415428H08	AIR WOUND INDUCTOR
L33	2415428H08	AIR WOUND INDUCTOR
L34	2415428H08	AIR WOUND INDUCTOR
L40	2414017K16	IND, 27.0 NH
L41	2414017K16	IND, 27.0 NH
L51	2414017N26	IND, 150.0 NH
L52	2414032F44	IDCTR, 680NH 130MA
L53	2113944A41	CAP,120.0PF 50V
L54	2414015A25	IDCTR, 1.2UH, 440MA
L55	2414017N15	IND, 18.0 NH
L81	2414015A19	IDCTR, 1UH 460MA
L100	2414017K27	IND, 220.0 NH
L101	2414017K27	IND, 220.0 NH
L102	2415429H13	CHIP INDUCTOR
L103	2415429H25	CHIP INDUCTOR
L110	2414017K27	IND, 220.0 NH
L120	2414017K27	IND, 220.0 NH
L121	2414032F25	IDCTR, 18NH 600MA
L130	2460591M27	COIL AIR WOUND, 22.69
L131	2460591M32	COIL AIR WOUND, 27.42
L132	2460591M27	COIL AIR WOUND, 22.70
L140	2113944C05	CAP, 390.0PF 50V
L141	2460591M27	COIL AIR WOUND, 22.71
L211	2414017K30	IND, 390.0 NH
L251	2414017N28	IND, 220.0 NH
L252	2414017N17	IND, 27.0 NH
L254	2415385H02	COIL AIR WOUND
L255	2414017N28	IND, 220.0 NH
L262	2414017N17	IND, 27.0 NH
L264	2415385H02	COIL AIR WOUND
L265	2414017N28	IND, 220.0 NH
L270	2414017N28	IND, 220.0 NH
L271	NOT PLACED	64AM DUMMY PART NUMBER
L272	2414017N28	IND, 220.0 NH
L276	2414017N17	IND, 27.0 NH
L281	2414017N18	IND, 33.0 NH
L282	2414017N14	IND, 15.0 NH

Circuit Ref	Motorola Part No.	Description
L283	NOT PLACED	64AM DUMMY PART NUMBER
L291	2414017N10	IND, 6.8 NH
L292	2414017N14	IND, 15.0 NH
L471	2414017K30	IND, 390.0 NH
M140	0286427Z02	NUT, ANTENNA
Q21	4802247J01	BJT, RF AMP, BFS505
Q22	4815267H01	DBRT UMT1NFTN
Q51	4802197J95	RF TRANSISTOR
Q70	4813973M07	TSTR NPN 40V .2A
Q100	4885593U03	TSTR NPN BFG540W
Q150	4813973M07	TSTR NPN 40V .2A
Q170	4809939C34	TSTR DUAL PNP
Q171	4813973A42	XSTR,BIP GP SS,NPN
Q280	4802245J95	BJT, NPN TRANSISTOR
Q311	4815069H02	TSTR MOSFET P-CHAN
Q312	4815069H02	TSTR MOSFET P-CHAN
Q313	4815066H01	XSTR, UMG5NFTR
Q402	4813973A42	XSTR,BIP GP SS,NPN
Q403	4813973A13	XSTR,BIP GP SS,PNP
Q410	4815066H01	XSTR, UMG5NFTR
Q425	4815069H02	TSTR MOSFET P-CHAN
Q426	4815069H02	TSTR MOSFET P-CHAN
Q427	4815069H02	TSTR MOSFET P-CHAN
Q440	4815154H01	DUAL TRANS NPN
Q470	4815267H01	DBRT UMT1NFTN
Q471	4815066H01	XSTR, UMG5NFTR
Q472	4815267H01	DBRT UMT1NFTN
Q481	NOT PLACED	64AM DUMMY PART NUMBER
Q482	NOT PLACED	64AM DUMMY PART NUMBER
Q490	4815066H01	XSTR, UMG5NFTR
Q493	4815069H02	TSTR MOSFET P-CHAN
Q494	4815066H01	XSTR, UMG5NFTR
Q520	4815154H01	DUAL TRANS NPN
R20	0613952Q91	RES 5600 OHM
R21	0613952Q46	RES 75.0 OHM
R22	0613952Q91	RES 5600 OHM
R23	0613952R11	RES 27K OHM
R24	0613952Q75	RES 1200 OHM
R25	0613952Q91	RES 5600 OHM
R40	0613952Q73	RES 1000 OHM
R51	0613952Q42	RES 51.0 OHM
R52	0613952R03	RES 12K OHM
R53	0613952R13	RES 33K OHM
R54	0613952Q90	RES 5100 OHM
R55	0613952Q61	RES 330 OHM
R57	0613952Q89	RES 4700 OHM
R60	0613952Q82	RES 2400 OHM
R61	0613952R25	RES 100K OHM
R62	0613952Q85	RES 3300 OHM
R63	0613952R15	RES 39K OHM
R64	0613952R08	RES 20K OHM
R65	0613952R15	RES 39K OHM
R66	0613952R08	RES 20K OHM
R67	0613952R08	RES 20K OHM
R72	0613952Q63	RES 390 OHM
R73	0613952Q79	RES 1800 OHM
R74	0613952Q75	RES 1200 OHM
R75	0613952R03	RES 12K OHM
R76	0613952Z55	RES 12K OHM
R77	0613952Z53	RES 8.2K OHM
R78	0613952Q69	RES 680 OHM
R80	0613952Q90	RES 5100 OHM
R81	0613952Q73	RES 1000 OHM
R82	NOT PLACED	64AM DUMMY PART NUMBER
R90	0613952Q42	RES 51.0 OHM
R91	0613952Q78	RES 1600 OHM
R100	0613952Q71	RES 820 OHM
R101	0613952Q19	RES 5.6 OHM
R102	0613952Q71	RES 820 OHM
R103	0613952Q84	RES 3000 OHM
R104	0613952H31	RES, 18.0 OHM
R105	0613952Q83	RES 2700 OHM
R106	0613952Q89	RES 4700 OHM
R107	NOT PLACED	64AM DUMMY PART NUMBER
R110	0613952Q66	RES 510 OHM
R111	0613952Q79	RES 1800 OHM
R120	0613958H53	RES 150 OHM
R121	0613958H53	RES 150 OHM
R150	0680539Z01	RESISTORS
R151	0613952H39	RES, 39.0 OHM
R152	0613952P01	RES, 100K OHM
R153	0613952P01	RES, 100K OHM
R154	0613952P01	RES, 100K OHM
R155	0613952P01	RES, 100K OHM
R156	0613952Q61	RES 330 OHM
R157	0613952Q81	RES 2200 OHM
R158	0613952Q90	RES 5100 OHM
R159	2113945C31	CAP, 0.1UF,50V-DC
R162	0613952R01	RES 10K OHM
R202	0613952R29	RES 150K OHM
R205	0613952Q49	RES 100 OHM
R206	NOT PLACED	64AM DUMMY PART NUMBER
R212	0613958J74	RES 0.0 OHM
R220	0613952Q33	RES 22.0 OHM
R221	0613952Q33	RES 22.0 OHM
R223	0613952Q49	RES 100 OHM
R227	0613952R15	RES 39K OHM
R230	0613952R10	RES 24K OHM
R243	0613952Q71	RES 820 OHM
R244	0613952Q42	RES 51.0 OHM
R245	0613952Q77	RES 1500 OHM
R246	0613952R25	RES 100K OHM
R247	0613952R18	RES 51K OHM
R253	0613952Q37	RES 33.0 OHM
R254	0613952Q49	RES 100 OHM
R255	0613952Z46	RES 3.9K OHM
R261	0613952R09	RES 22K OHM
R262	0613952Q93	RES 6800 OHM
R263	0613952Q37	RES 33.0 OHM
R264	0613952Q49	RES 100 OHM
R271	0613952Q89	RES 4700 OHM
R272	0613952Q91	RES 5600 OHM
R273	0613952Q61	RES 330 OHM
R274	0613952Q37	RES 33.0 OHM
R275	0613952Q49	RES 100 OHM
R276	NOT PLACED	64AM DUMMY PART NUMBER
R277	0613952G67	RES, 0.0 OHM
R280	0613952Q89	RES 4700 OHM
R281	0613952Q95	RES 8200 OHM
R282	0613952Q72	RES 910 OHM
R283	0613952Q52	RES 130 OHM
R284	0613952Q61	RES 330 OHM
R285	0613952R66	RES 0.0 OHM
R310	0613952R25	RES 100K OHM
R311	0613952R25	RES 100K OHM
R312	0613952R08	RES 20K OHM
R313	0613952R01	RES 10K OHM
R320	0613952Z80	RES 330K OHM
R321	0613952P30	RES 200K OHM
R322	0613952R25	RES 100K OHM
R400	NOT PLACED	64AM DUMMY PART NUMBER
R401	0613952R36	RES 300K OHM
R402	0613952R01	RES 10K OHM
R403	0613952R01	RES 10K OHM
R404	0613952R18	RES 51K OHM
R405	0613952R36	RES 300K OHM
R406	0613952R33	RES 220K OHM
R407	0613952R25	RES 100K OHM
R408	0613952R25	RES 100K OHM
R409	0613952Q73	RES 1000 OHM
R410	0613952R01	RES 10K OHM
R411	0613952Q71	RES 820 OHM
R412	0613952R25	RES 100K OHM
R413	0613952R25	RES 100K OHM
R414	0613952R13	RES 33K OHM
R415	0613952R13	RES 33K OHM
R416	0613952R08	RES 20K OHM
R417	0613952R01	RES 10K OHM
R418	0613952R25	RES 100K OHM
R419	0613952Q89	RES 4700 OHM
R420	0613952P30	RES 200K OHM
R421	0613952P01	RES, 100K OHM
R422	0613952R25	RES 100K OHM
R423	0613952R25	RES 100K OHM
R424	0613952P30	RES 200K OHM
R425	0613952P01	RES, 100K OHM
R430	0613952R25	RES 100K OHM
R431	NOT PLACED	64AM DUMMY PART NUMBER
R432	0613952R66	RES 0.0 OHM
R433	0613952R25	RES 100K OHM
R434	NOT PLACED	64AM DUMMY PART NUMBER
R440	0613952Q89	RES 4700 OHM
R441	0613952Q89	RES 4700 OHM
R442	0613952H57	RES, 220 OHM
R443	0613952H51	RES, 120 OHM
R445	0613952Q89	RES 4700 OHM
R446	0613952R01	RES 10K OHM
R451	0613952R17	RES 47K OHM
R460	0613952R10	RES 24K OHM
R462	0613952R10	RES 24K OHM
R463	0613952R10	RES 24K OHM
R464	0613952R12	RES 30K OHM
R469	0613952Q25	RES 10.0 OHM
R470	0613952Q81	RES 2200 OHM
R471	0613952Q81	RES 2200 OHM
R472	0613952Q69	RES 680 OHM
R473	0613952Q69	RES 680 OHM
R474	0613952H61	RES, 330 OHM
R475	0613952R31	RES 180K OHM
R476	0613952R25	RES 100K OHM
R477	0613952Q81	RES 2200 OHM
R478	0613952Q81	RES 2200 OHM
R479	0613952R25	RES 100K OHM
R480	0613952G67	RES, 0.0 OHM
R481	NOT PLACED	64AM DUMMY PART NUMBER
R482	NOT PLACED	64AM DUMMY PART NUMBER
R483	NOT PLACED	64AM DUMMY PART NUMBER
R484	NOT PLACED	64AM DUMMY PART NUMBER
R485	NOT PLACED	64AM DUMMY PART NUMBER

Circuit Ref	Motorola Part No.	Description
R486	NOT PLACED	64AM DUMMY PART NUMBER
R487	0613952R66	RES 0.0 OHM
R488	0613952R37	RES 330K OHM
R489	NOT PLACED	64AM DUMMY PART NUMBER
R490	NOT PLACED	64AM DUMMY PART NUMBER
R491	0613952R66	RES 0.0 OHM
R492	0613952R10	RES 24K OHM
R493	0613952R37	RES 330K OHM
R494	0613952Z80	RES 330K OHM
R495	0613952Q91	RES 5600 OHM
R496	NOT PLACED	64AM DUMMY PART NUMBER
R497	NOT PLACED	64AM DUMMY PART NUMBER
R498	NOT PLACED	64AM DUMMY PART NUMBER
R499	NOT PLACED	64AM DUMMY PART NUMBER
R501	0613952Q49	RES 100 OHM
R502	0613952Q49	RES 100 OHM
R503	0613952Q49	RES 100 OHM
R504	0613952Q49	RES 100 OHM
R505	0613952Q49	RES 100 OHM
R506	0613952Q49	RES 100 OHM
R507	0613952Q49	RES 100 OHM
R508	0613952R25	RES 100K OHM
R509	0613952R25	RES 100K OHM
R510	0613952R37	RES 330K OHM
R511	0613952R25	RES 100K OHM
R512	0613952R29	RES 150K OHM
R513	0613952R25	RES 100K OHM
R514	0613952R25	RES 100K OHM
R515	0613952R66	RES 0.0 OHM
R516	NOT PLACED	64AM DUMMY PART NUMBER
R517	NOT PLACED	64AM DUMMY PART NUMBER
R518	0613952R33	RES 220K OHM
R519	0613952R25	RES 100K OHM
R520	0613952R25	RES 100K OHM
R521	NOT PLACED	64AM DUMMY PART NUMBER
R522	0613952R25	RES 100K OHM
R523	0613952R01	RES 10K OHM
S440	4080710Z25	SWITCH, FREQUENCY (CP150/CP200 16CH)
S440	4080710Z34	SWITCH, FREQUENCY (CP150/CP200 4CH)
S441	4070354A01	LIGHT TOUCH SWITCH
S442	4070354A01	LIGHT TOUCH SWITCH
S443	4070354A01	LIGHT TOUCH SWITCH
S444	1880619Z04	VOL POTENTIOMETER
SH1	2686421Z02	SHIELD, FE
SH40	2686419Z02	SHIELD, MIXER
SH50	2686423Z02	SHIELD, 19 X 19 X 3.03 MM
SH52	2686424Z02	SHIELD, IF
SH100	2686418Z02	SHIELD, HARMONIC FILTER
SH200	2686424Z02	SHIELD, IF
SH201	2686423Z02	SHIELD, 19 X 19 X 3.03 MM
SH250	2686425Z02	SHIELD
SH251	2686425Z02	SHIELD
SH253	2686422Z02	SHIELD, BUFFER
SH400	2686420Z03	SHIELD,CONTROL
SH401	2686420Z03	SHIELD,CONTROL
T41	2515121H01	BALUN, TRANSFORMER
T42	2515121H01	BALUN, TRANSFORMER
U51	5115281H01	FM IF IC SA616
U52	5115070H01	IC INVTR, TC7W04FU
U110	0186438Z05	UHF1 PA MODULE
U150	5114005A01	IC SING SPLY
U151	2415954H01	INDUCTOR BEAD CHIP
U201*	5185177Y01	IC AT25016 48 PIN
U251	5105750U56	VCO BUFFER IC
U310	5115746H01	VOLTAGE REGULATOR, 5V
U320	5115679H01	IC VOLTAGE REGLTR
U330	5115745H01	VOLTAGE REGULATOR, 3V
U401*	5185143E03	IC, MICROP, 3.7MHZ
U402*	5115033H01	IC,EEPROM 16K
U403	NOT PLACED	64AM DUMMY PART NUMBER
U404*	5115037H01	4M FLASH ROM IC
U425	5115697H01	LOW PWR OP AMP
U451	5115062H01	IC, CUST, TQFP48
U480	NOT PLACED	64AM DUMMY PART NUMBER
U490	5116029H01	1 W AUDIO AMPLIFIER
U510	5114005A01	IC SING SPLY
U511	4815066H01	XSTR, UMG5NFTR
VR110	4813977A59	DIODE, 3.9V 0.2W
VR301	4813977M29	DIODE 20V ZENER
VR302	4813977M29	DIODE 20V ZENER
VR471	4813977M14	DIODE, 6.8V 0.225W
VR472	4813977M05	DIODE, 3.3V 0.225W
VR473	4813977M29	DIODE 20V ZENER
VR474	4813977M29	DIODE 20V ZENER
VR475	4813977M24	DIODE,ZEN,MBZ5245
Y51	4802245J84	XTAL 44.395MHz, 3RD OT
Y70	9186145B02	CER.DISCR. CDBCA455CX36-TC
Y201*	4880114R08	CRYSTAL, QUARTZ 16.8 MHZ
Y202	NOT PLACED	64AM DUMMY PART NUMBER
	8416205H02	ELP UHF BAND 1 MAIN BOARD
	5480678Z01	LABEL BARCODE

* Motorola Depot Servicing only

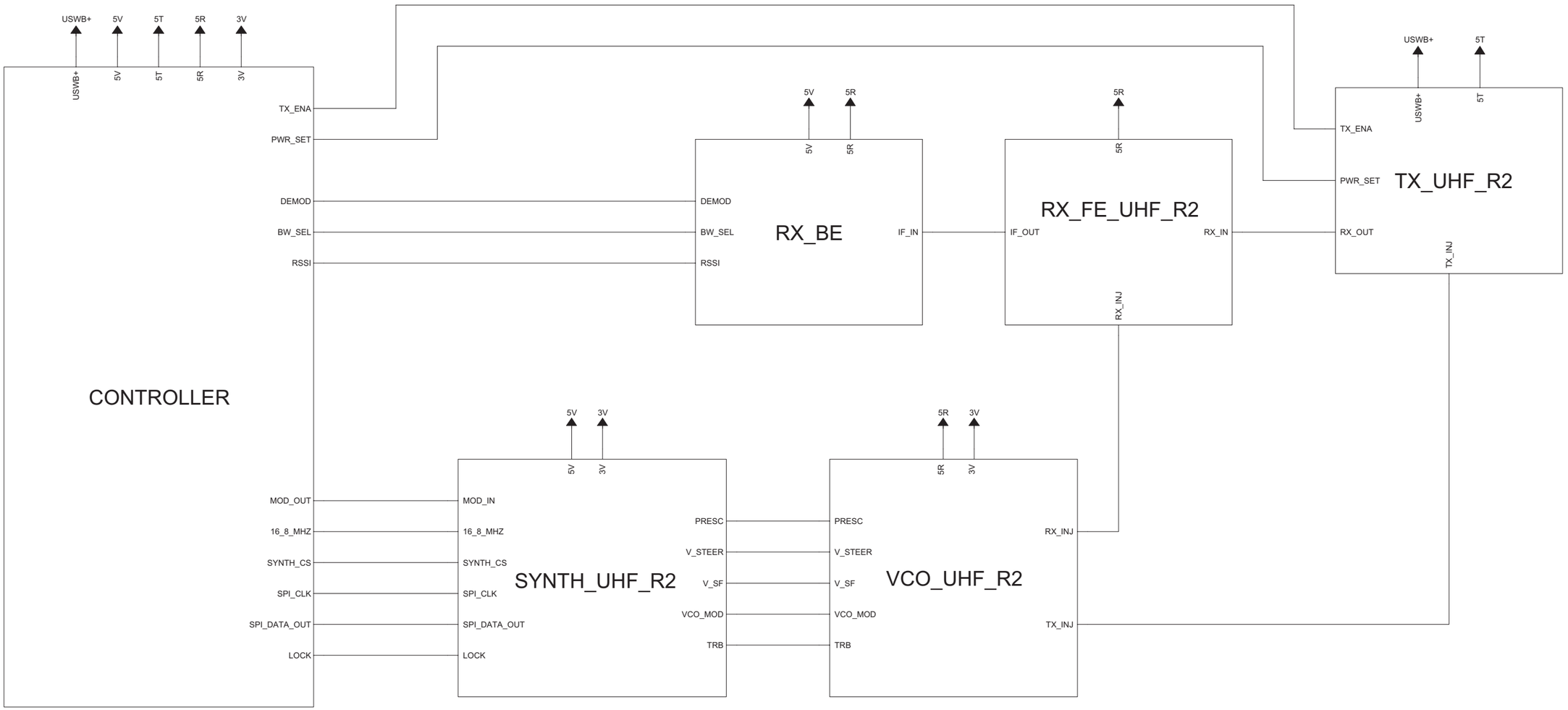


Figure 13-27. UHF (403–440 MHz) Radio Circuit Block Interconnect Diagram (8416205H04-F)

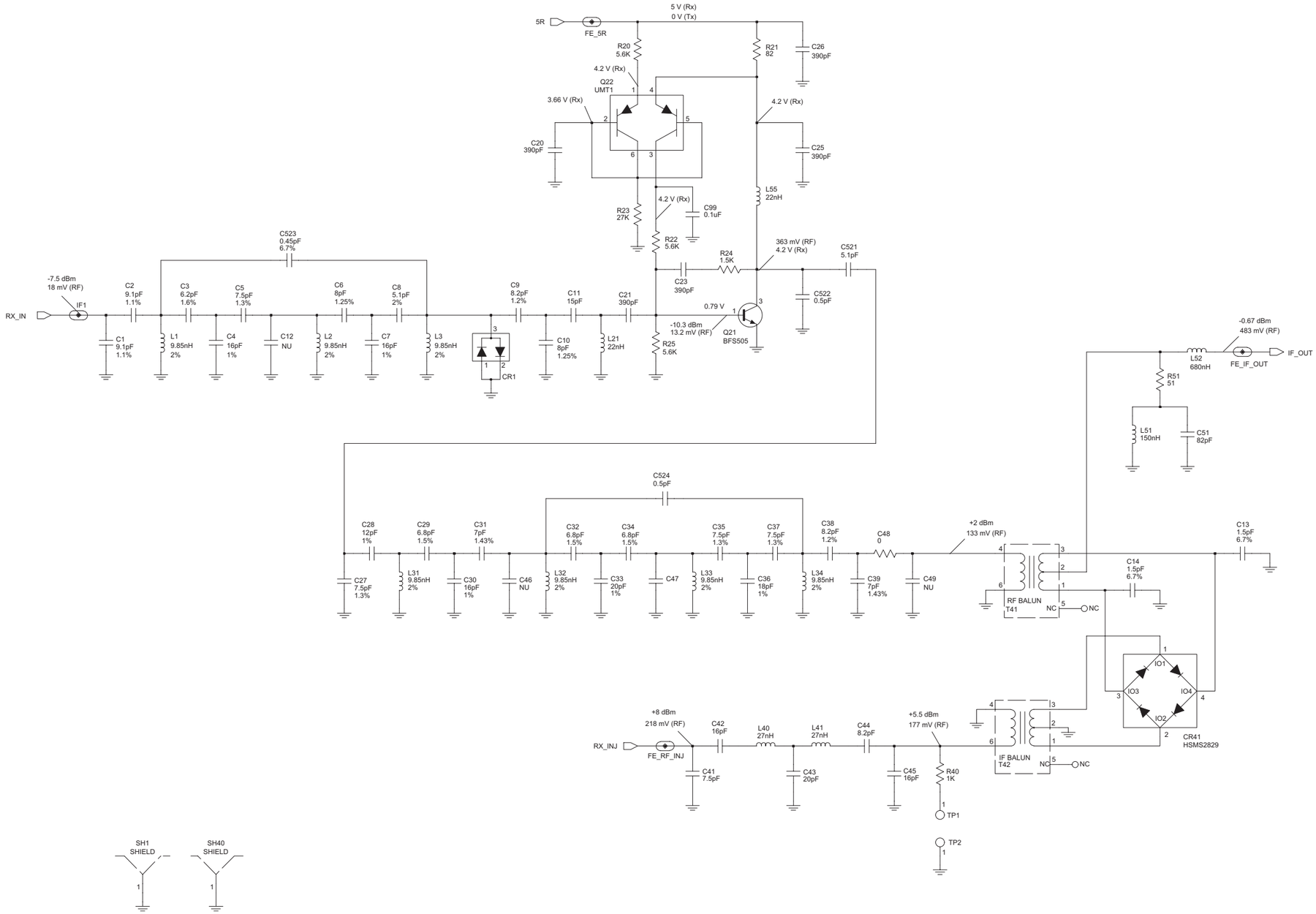


Figure 13-28. UHF (403–440 MHz) Receiver Front End Schematic Diagram (8416205H04-F)

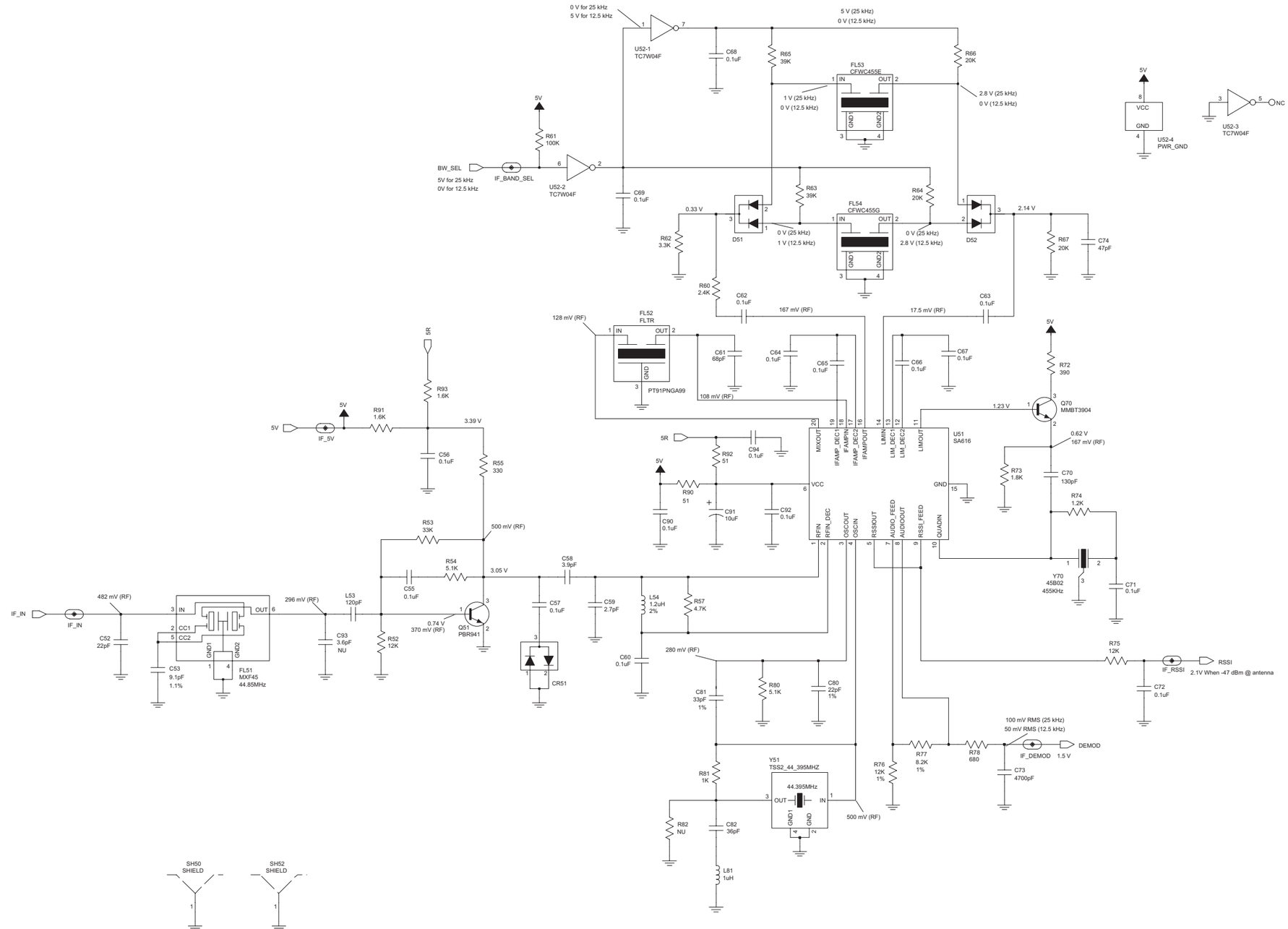
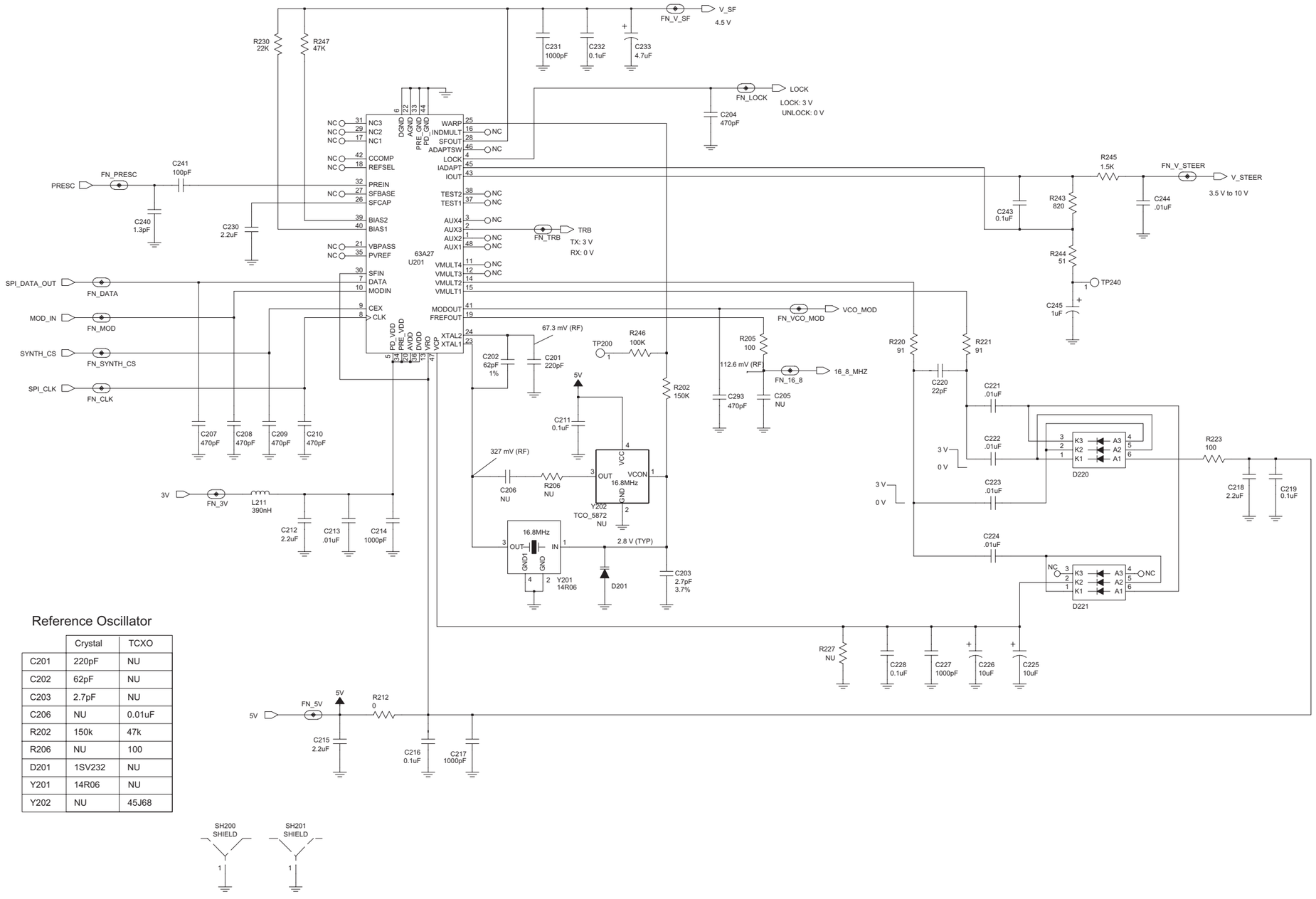


Figure 13-29. UHF (403–440 MHz) Receiver Back End Schematic Diagram (8416205H04-F)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 13-30. UHF (403–440 MHz) Synthesizer Schematic Diagram (8416205H04-F)

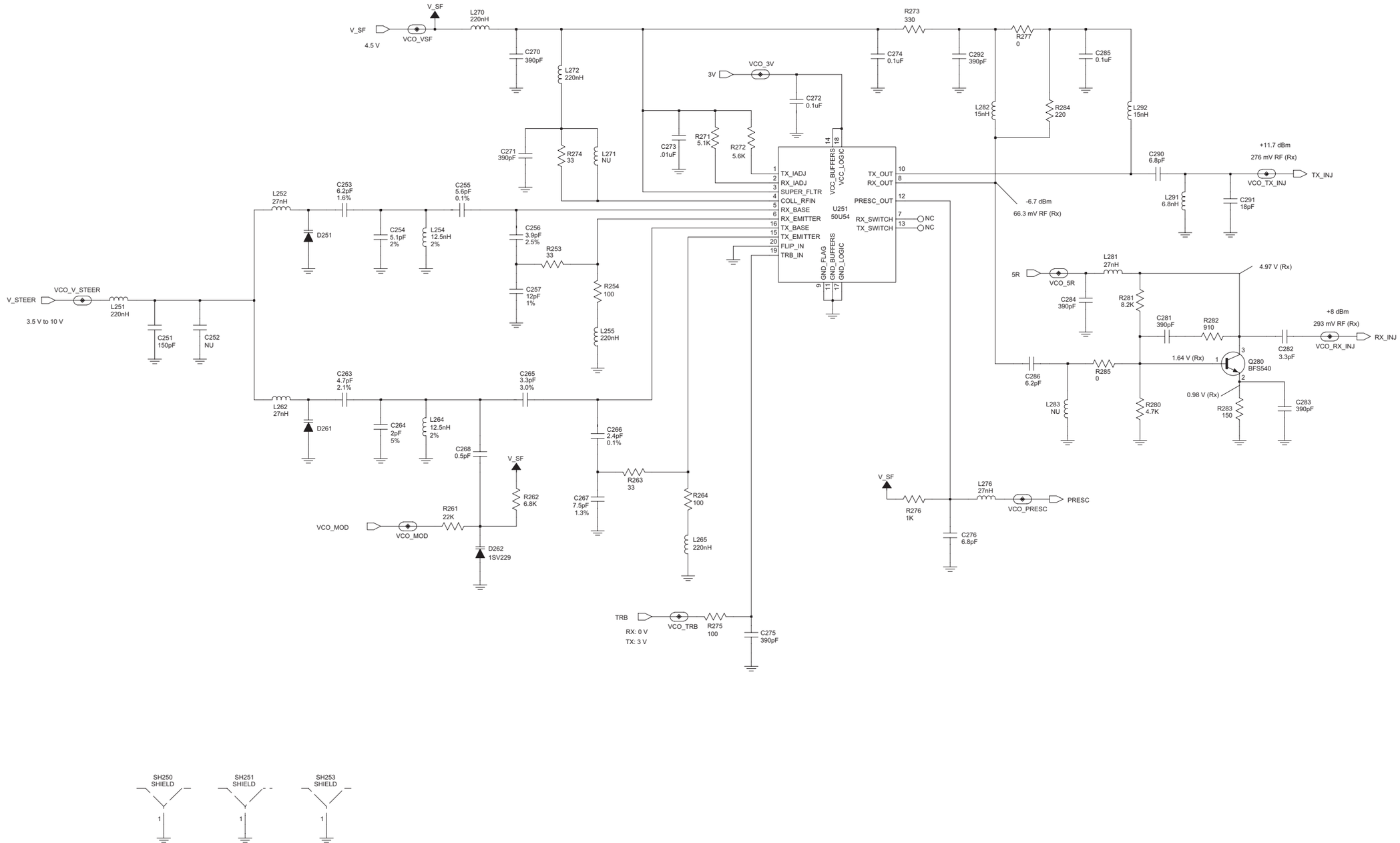


Figure 13-31. UHF (403–440 MHz) Voltage Controlled Oscillator Schematic Diagram (8416205H04-F)

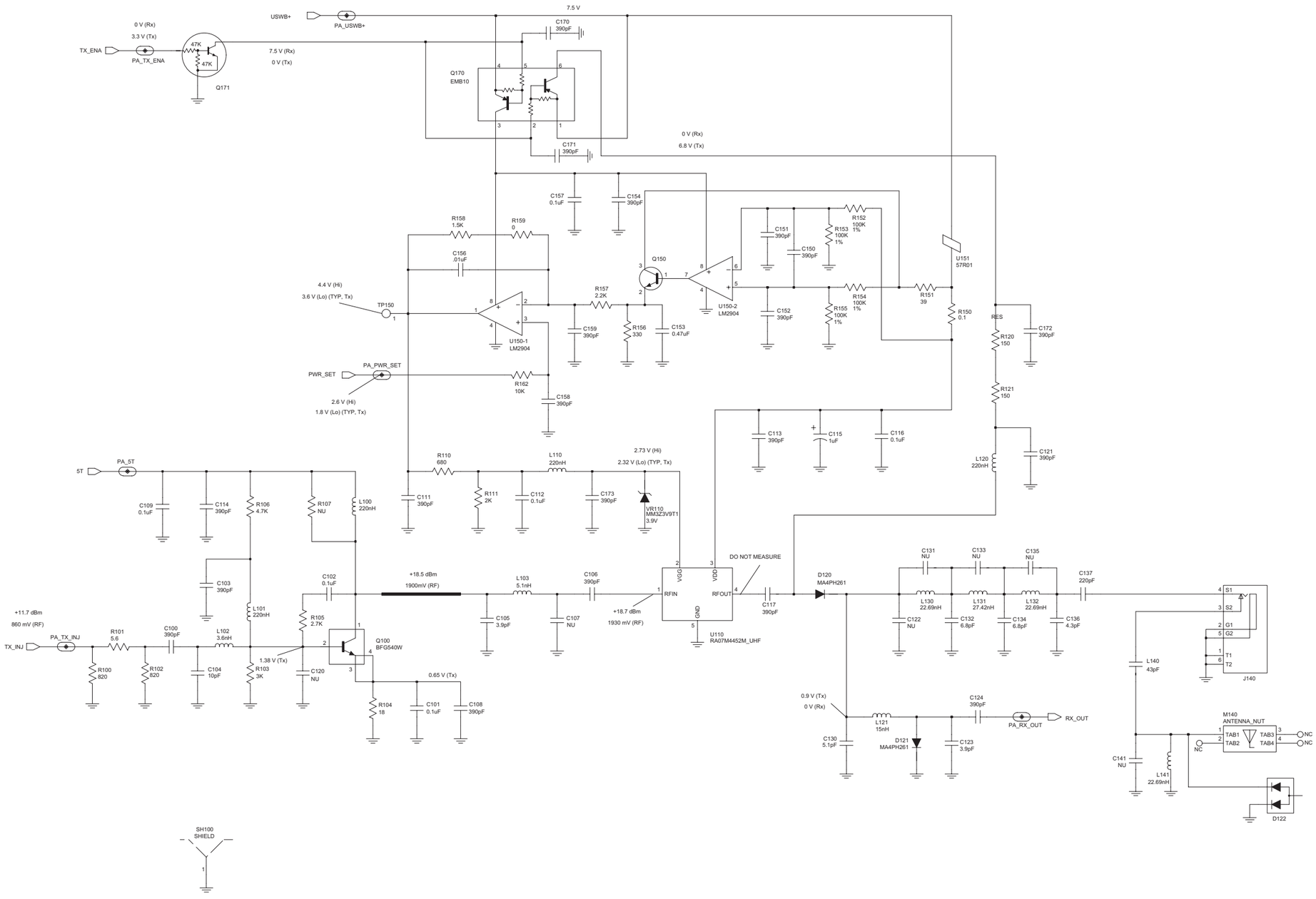


Figure 13-32. UHF (403–440 MHz) Transmitter and Power Control Schematic Diagram (8416205H04-F)

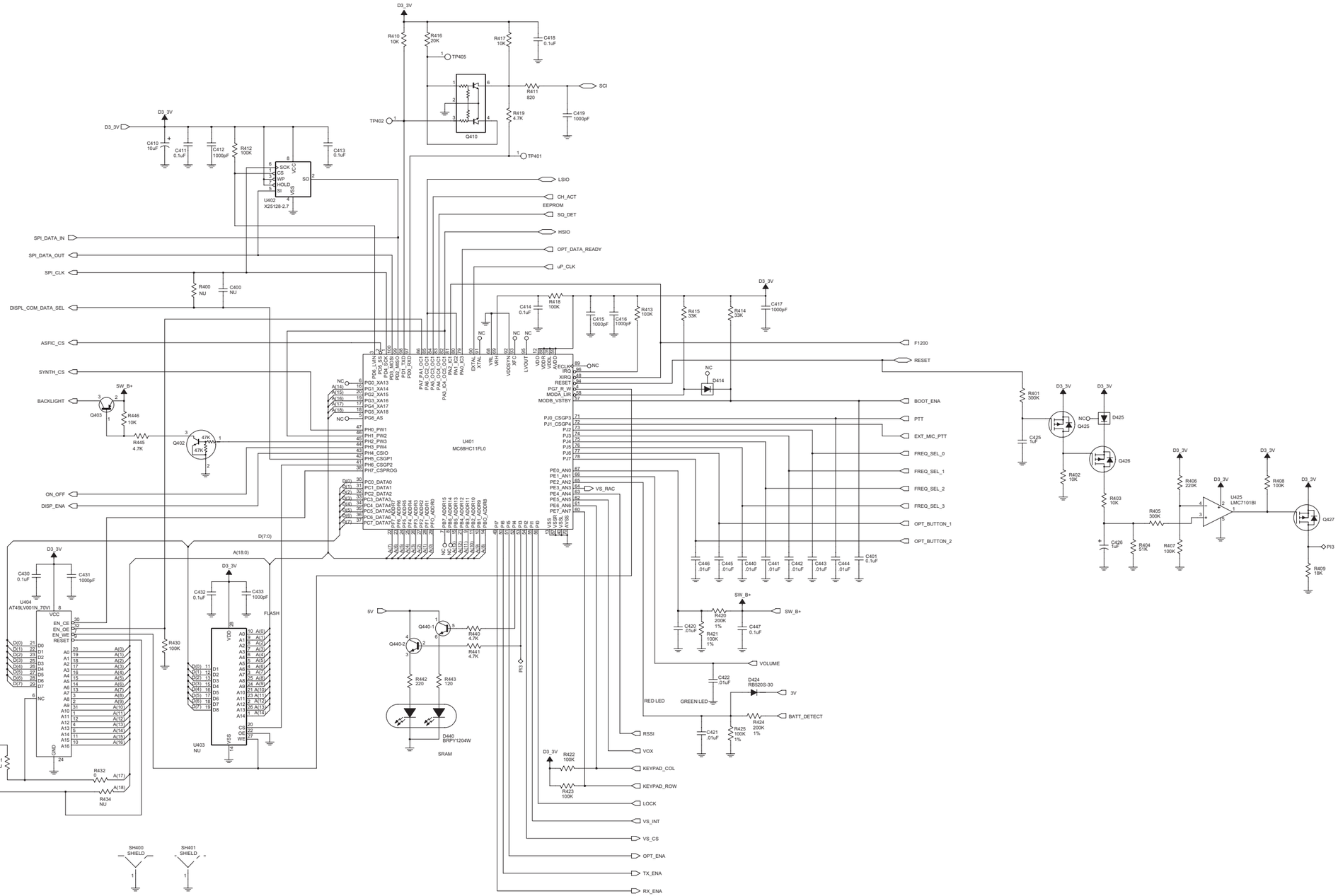


Figure 13-33. UHF (403–440 MHz) Microprocessor Circuitry Schematic Diagram (8416205H04-F)

	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

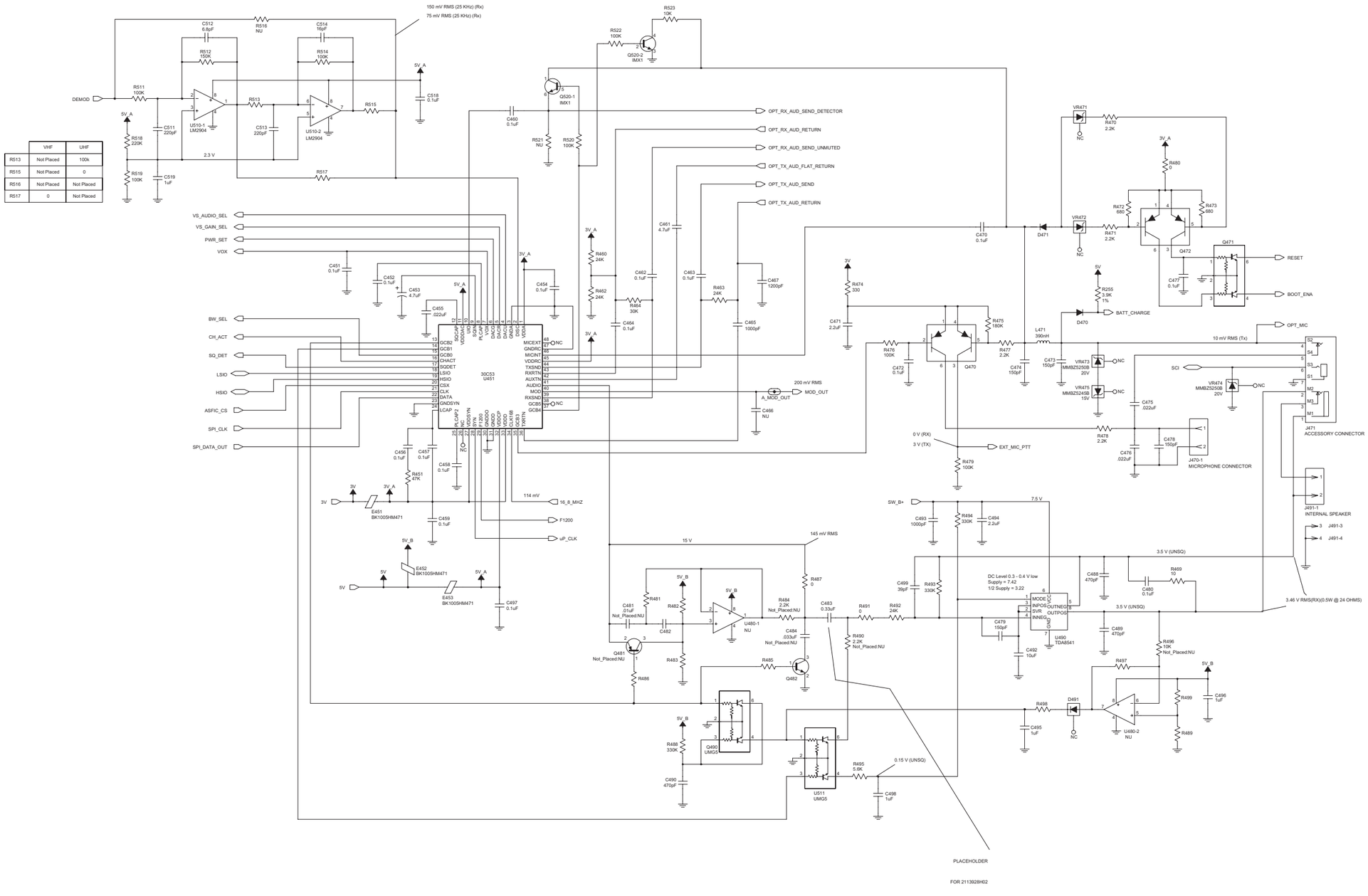


Figure 13-34. UHF (403–440 MHz) Audio Circuitry Schematic Diagram (8416205H04-F)

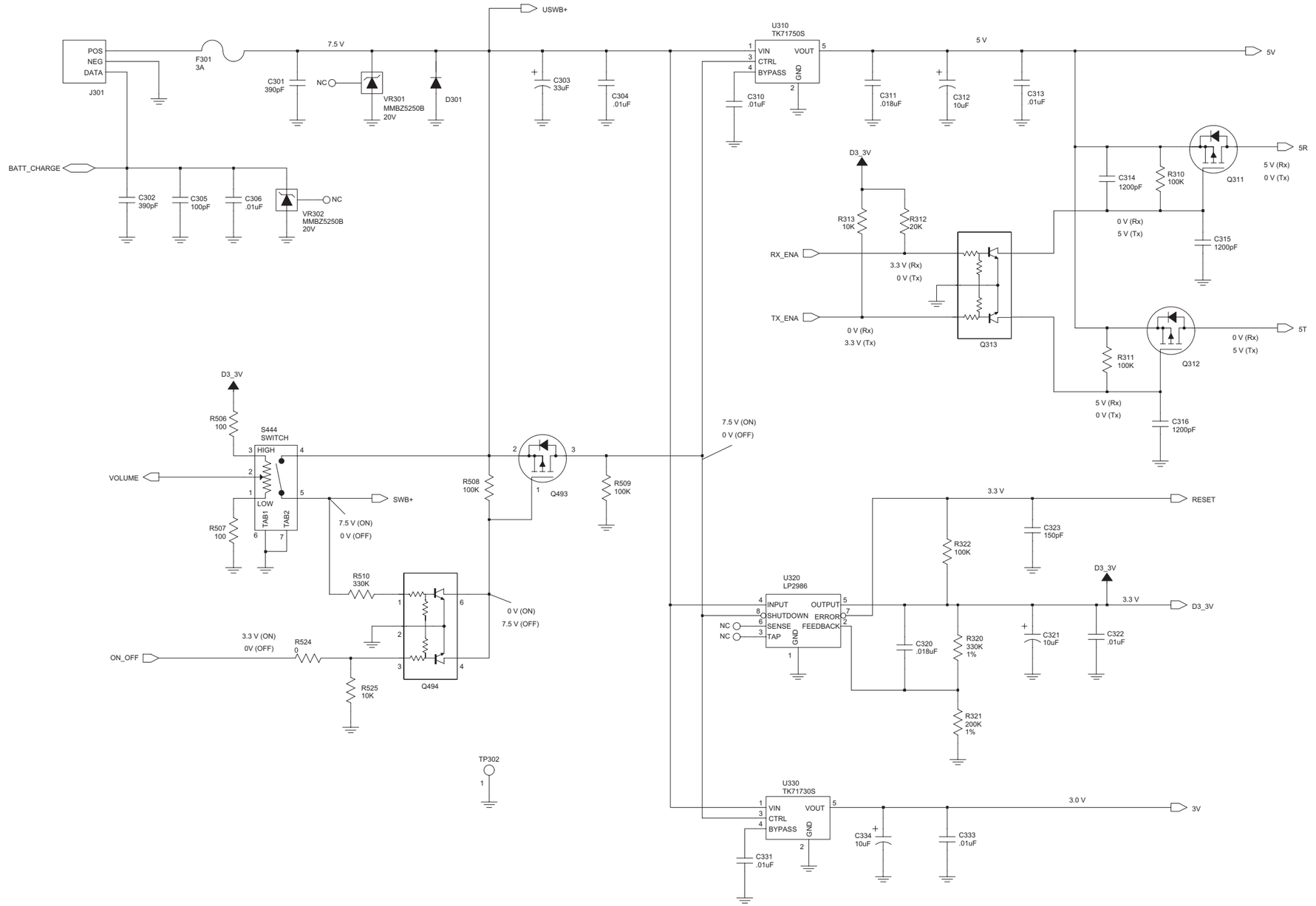


Figure 13-35. UHF (403–440 MHz) DC Regulation Schematic Diagram (8416205H04-F)

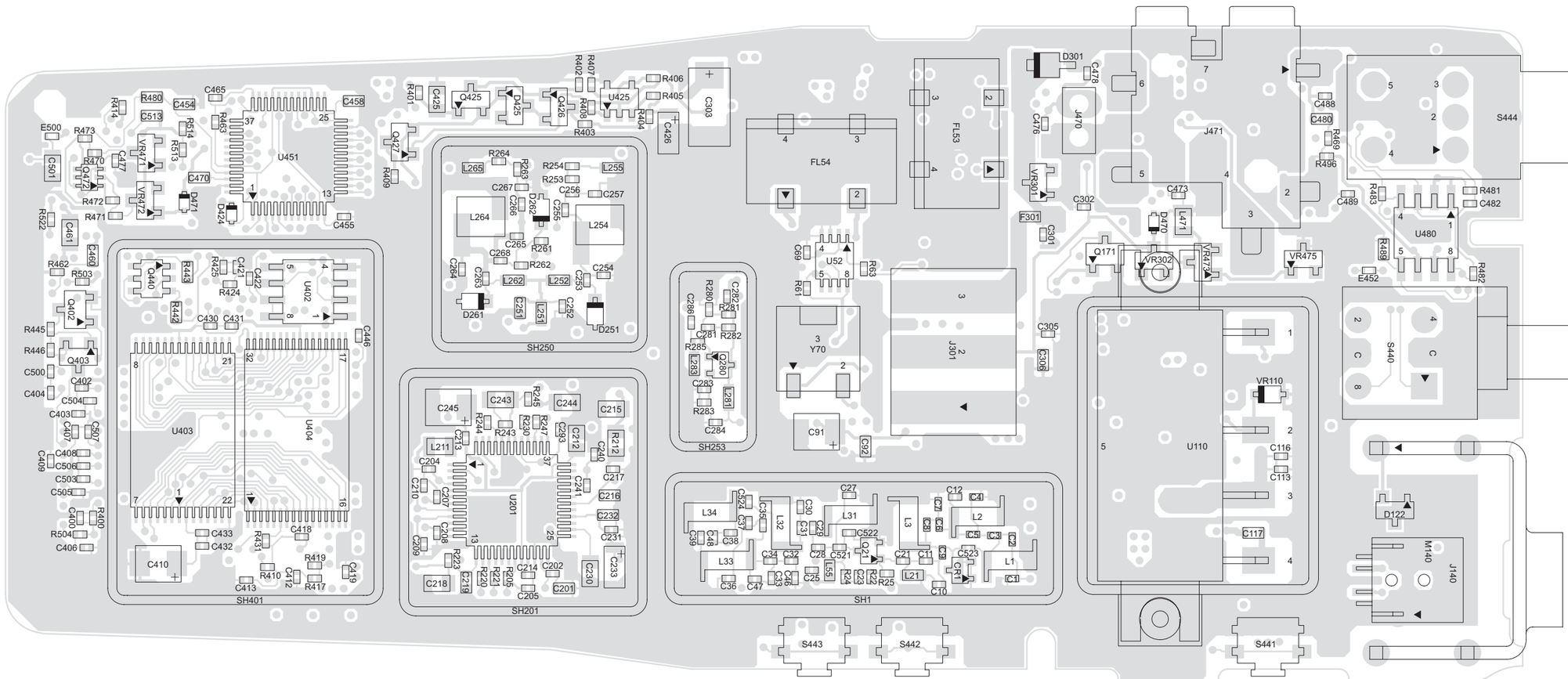


Figure 13-36. UHF (403–440 MHz) Board Component Side View (8416205H04-F)

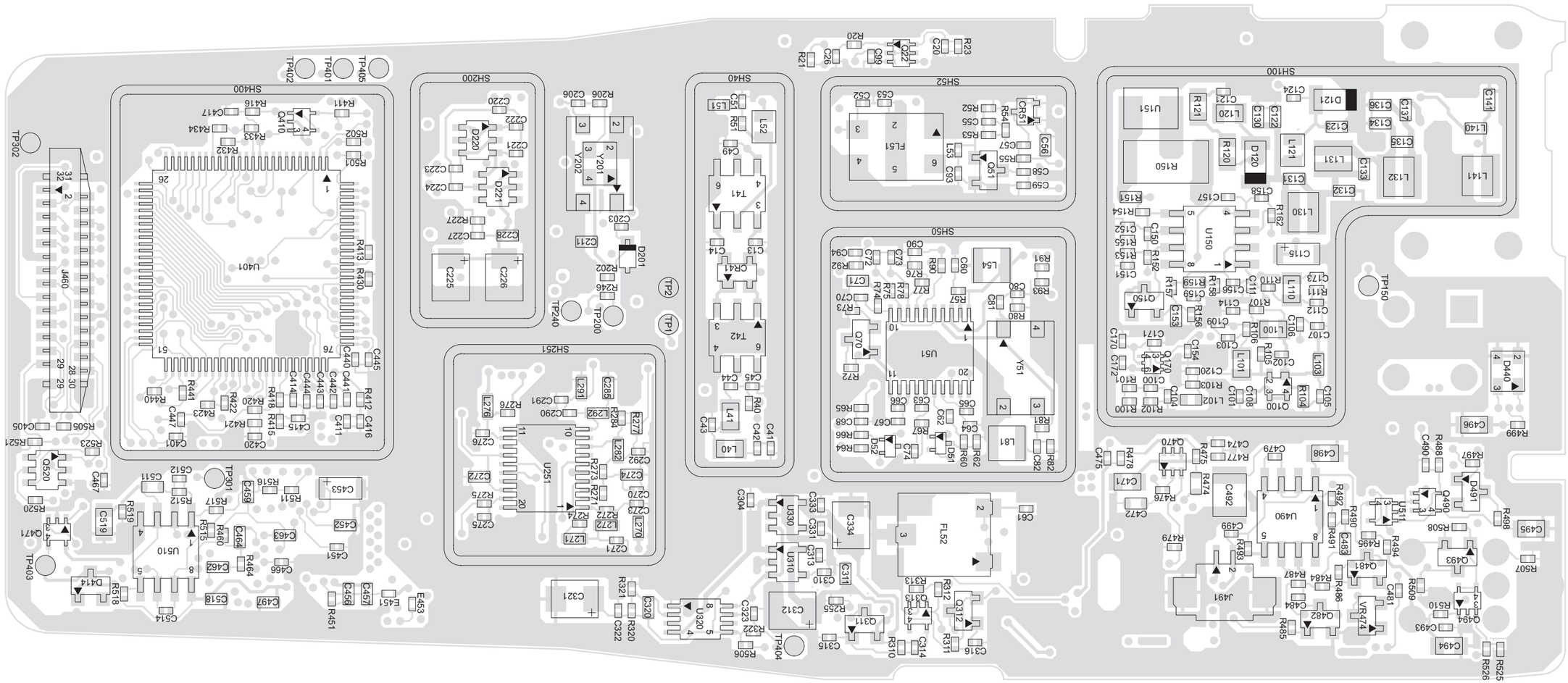


Figure 13-37. UHF (403–440 MHz) Board Solder Side View (8416205H04-F)

UHF (403–440 MHz) Radio Parts List (8416205H04-F)

Circuit Ref	Motorola Part No.	Description
C1	2115153H37	CAP, CERAMIC, COG
C2	2115153H39	CAP, CERAMIC, COG
C3	2115153H09	CAP, CERAMIC, COG
C4	NOT PLACED	64AM DUMMY PART NUMBER
C5	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
C6	2115153H09	CAP, CERAMIC, COG
C7	NOT PLACED	64AM DUMMY PART NUMBER
C8	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
C9	2115153H39	CAP, CERAMIC, COG
C10	2115153H36	CAP, CERAMIC, COG
C11	2115153H40	CAP, CERAMIC, COG
C12	2115153H27	CAP, CERAMIC, COG
C13	2115153H12	CAP, CERAMIC, COG
C14	2115153H12	CAP, CERAMIC, COG
C20	2113945A04	CAP CER CHP 390PF 50V 10%
C21	2113945A04	CAP CER CHP 390PF 50V 10%
C23	2113945A04	CAP CER CHP 390PF 50V 10%
C25	2113945A04	CAP CER CHP 390PF 50V 10%
C26	2113945A04	CAP CER CHP 390PF 50V 10%
C27	2115153H26	CAP, CERAMIC, COG
C28	2115153H37	CAP, CERAMIC, COG
C29	2115153H25	CAP, CERAMIC, COG
C30	2115153H41	CAP,CERAMIC CHIP,22PF, +1%,-1%,50V-
C31	2115153H26	CAP, CERAMIC, COG
C32	2115153H24	CAP, CERAMIC, COG
C33	2115153H39	CAP, CERAMIC, COG
C34	2115153H22	CAP, CERAMIC, COG
C35	2115153H35	CAP, CERAMIC, COG
C36	2115153H38	CAP, CERAMIC, COG
C37	2115153H22	CAP, CERAMIC, COG
C38	2115153H38	CAP, CERAMIC, COG
C39	2115153H35	CAP, CERAMIC, COG
C41	2115153H37	CAP, CERAMIC, COG
C42	2115153H27	CAP, CERAMIC, COG
C43	2115153H44	CAP, CERAMIC, COG
C44	2115153H27	CAP, CERAMIC, COG
C45	2115153H41	CAP,CERAMIC CHIP,22PF, +1%,-1%,50V-
C46	NOT PLACED	64AM DUMMY PART NUMBER
C47	NOT PLACED	64AM DUMMY PART NUMBER
C48	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
C49	NOT PLACED	64AM DUMMY PART NUMBER
C51	2113944A38	CAP CER CHP 82.0PF 50V 5%
C52	2115153H39	CAP, CERAMIC, COG
C53	2115153H26	CAP, CERAMIC, COG
C55	2113946K02	CAP CER CHP 0.10UF 16V
C56	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C57	2113946K02	CAP CER CHP 0.10UF 16V
C58	2113944A15	CAP CER CHP 3.9PF 50V +/- 0.25PF
C59	2113944A11	CAP CER CHP 2.7PF 50V +/- 0.25PF
C60	2113946K02	CAP CER CHP 0.10UF 16V
C61	2113944A36	CAP CER CHP 68.0PF 50V 5%
C62	2113946K02	CAP CER CHP 0.10UF 16V
C63	2113946K02	CAP CER CHP 0.10UF 16V
C64	2113946K02	CAP CER CHP 0.10UF 16V
C65	2113946K02	CAP CER CHP 0.10UF 16V
C66	2113946K02	CAP CER CHP 0.10UF 16V
C67	2113946K02	CAP CER CHP 0.10UF 16V
C68	2113946K02	CAP CER CHP 0.10UF 16V
C69	2113946K02	CAP CER CHP 0.10UF 16V
C70	2113944A87	CAP,FXD,130PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,P
C71	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C72	2113946K02	CAP CER CHP 0.10UF 16V
C73	2113945A13	CAP CER CHP 4700PF 50V 10%
C74	2113944A33	CAP CER CHP 47.0PF 50V 5%
C80	2115153H41	CAP,CERAMIC CHIP,22PF, +1%,-1%,50V-
C81	2115153H45	CAP, CERAMIC, COG
C82	2115153H45	CAP, CERAMIC, COG
C90	2113946K02	CAP CER CHP 0.10UF 16V
C91	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C92	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C93	NOT PLACED	64AM DUMMY PART NUMBER
C94	NOT PLACED	64AM DUMMY PART NUMBER
C99	2113946K02	CAP CER CHP 0.10UF 16V
C100	2113945A04	CAP CER CHP 390PF 50V 10%
C101	2113946K02	CAP CER CHP 0.10UF 16V
C102	2113946K02	CAP CER CHP 0.10UF 16V
C103	2113945A04	CAP CER CHP 390PF 50V 10%
C104	2113944A25	CAP CER CHP 10.0PF 50V +/- 0.5PF
C105	2113944A63	CAP,FXD,1PF,.25PF+/-, 50V-DC,0402,C0G,-55DEG CMIN, 125DEG CMAX,P
C106	2113945A04	CAP CER CHP 390PF 50V 10%
C107	2113944A12	CAP CER CHP 3.0PF 50V +/- 0.25PF
C108	2113945A04	CAP CER CHP 390PF 50V 10%
C109	2113946K02	CAP CER CHP 0.10UF 16V
C111	2113945A04	CAP CER CHP 390PF 50V 10%
C112	2113946K02	CAP CER CHP 0.10UF 16V
C113	2113945A04	CAP CER CHP 390PF 50V 10%
C114	2113945A04	CAP CER CHP 390PF 50V 10%
C115	2313960B01	CAP,FXD,1UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,87MA,E
C116	2113946K02	CAP CER CHP 0.10UF 16V
C117	2113944C05	CAP CER CHP 390.0PF 50V 5%
C120	NOT PLACED	64AM DUMMY PART NUMBER
C121	2113945A04	CAP CER CHP 390PF 50V 10%
C122	2113944C76	CAP,FXD,9.1PF,.25PF+/-, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX
C123	2113944C71	CAP,FXD,5.6PF,.25PF+/-, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX
C124	2113945A01	CAP CER CHP 220PF 50V 10,
C130	NOT PLACED	64AM DUMMY PART NUMBER
C131	NOT PLACED	64AM DUMMY PART NUMBER
C132	2113944C30	CAP CER CHP 10.0PF 50V +/- 0.5PF
C133	NOT PLACED	64AM DUMMY PART NUMBER
C134	2113944C75	CAP,FXD,8.2PF,.25PF+/-, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX
C135	NOT PLACED	64AM DUMMY PART NUMBER
C136	2113944C21	CAP CER CHP 4.3PF 50V +/- 0.25PF
C137	2113944C02	CAP CER CHP 220.0PF 50V 5%
C141	NOT PLACED	64AM DUMMY PART NUMBER
C150	2113945A04	CAP CER CHP 390PF 50V 10%
C151	2113945A04	CAP CER CHP 390PF 50V 10%
C152	2113945A04	CAP CER CHP 390PF 50V 10%
C153	2113946L04	CAP CER CHP 0.47UF 16V
C154	2113945A04	CAP CER CHP 390PF 50V 10%
C156	2113945B02	CAP CER CHP 10,000PF 25V 10%
C157	2113946K02	CAP CER CHP 0.10UF 16V
C158	2113945A04	CAP CER CHP 390PF 50V 10%
C159	2113945A04	CAP CER CHP 390PF 50V 10%
C170	2113945A04	CAP CER CHP 390PF 50V 10%
C171	2113945A04	CAP CER CHP 390PF 50V 10%
C172	2113945A04	CAP CER CHP 390PF 50V 10%
C173	2113945A04	CAP CER CHP 390PF 50V 10%
C201	2113944C02	CAP CER CHP 220.0PF 50V 5%
C202	2115153H52	CAP, CERAMIC, COG
C203	2115153H13	CAP, CERAMIC, COG
C204	2113945A05	CAP CER CHP 470PF 50V 10%
C205	NOT PLACED	64AM DUMMY PART NUMBER

Circuit Ref	Motorola Part No.	Description
C206	NOT PLACED	64AM DUMMY PART NUMBER
C207	2113945A05	CAP CER CHP 470PF 50V 10%
C208	2113945A05	CAP CER CHP 470PF 50V 10%
C209	2113945A05	CAP CER CHP 470PF 50V 10%
C210	2113945A05	CAP CER CHP 470PF 50V 10%
C211	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C212	2113946N03	CAP CER CHP 2.2UF 16V
C213	2113945B02	CAP CER CHP 10,000PF 25V 10%
C214	2113945A09	CAP CER CHP 1000PF 50V 10%
C215	2113946N03	CAP CER CHP 2.2UF 16V
C216	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C217	2113945A09	CAP CER CHP 1000PF 50V 10%
C218	2113946N03	CAP CER CHP 2.2UF 16V
C219	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C220	2113944A29	CAP CER CHP 22.0PF 50V 5%
C221	2113945B02	CAP CER CHP 10,000PF 25V 10%
C222	2113945B02	CAP CER CHP 10,000PF 25V 10%
C223	2113945B02	CAP CER CHP 10,000PF 25V 10%
C224	2113945B02	CAP CER CHP 10,000PF 25V 10%
C225	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN,125DEG CMAX,174MA
C226	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN,125DEG CMAX,174MA
C227	2113945A09	CAP CER CHP 1000PF 50V 10%
C228	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C230	2113946N03	CAP CER CHP 2.2UF 16V
C231	2113945A09	CAP CER CHP 1000PF 50V 10%
C232	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C233	2313960B30	CAP,FXD,4.7UF,+10%,-10%, 10V-DC,SM,-55DEG CMIN, 125DEG CMAX,122MA
C240	2113944A03	CAP CER CHP 1.3PF 50V +/- 0.25PF
C241	2113944A40	CAP CER CHP 100.0PF 50V 5%
C243	0886641Z01	CAP,FILM,.1UF,+20%,-20%, 16V-DC,12V-
C244	0888600M25	CAP MTL PPS FILM 10NF 50 3216
C245	2313960C26	CAP,FXD,1UF,+10%,-10%, 35V-DC,SM,-55DEG CMIN, 125DEG CMAX,114MA,E
C251	0888600M03	CAP
C252	NOT PLACED	64AM DUMMY PART NUMBER
C253	2115153H22	CAP, CERAMIC, COG
C254	2115153H24	CAP, CERAMIC, COG
C255	2115153H21	CAP, CERAMIC, COG
C256	2115153H16	CAP, CERAMIC, COG
C257	2115153H27	CAP, CERAMIC, COG
C263	2115153H29	CAP, CERAMIC, COG
C264	2115153H15	CAP, CERAMIC, COG
C265	2115153H15	CAP, CERAMIC, COG
C266	2115153H15	CAP, CERAMIC, COG
C267	2115153H23	CAP, CERAMIC, COG
C268	2115153H01	CAP, CERAMIC, COG
C270	2113945A04	CAP CER CHP 390PF 50V 10%
C271	2113945A04	CAP CER CHP 390PF 50V 10%
C272	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C273	2113945B02	CAP CER CHP 10,000PF 25V 10%
C274	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C275	2113945A04	CAP CER CHP 390PF 50V 10%
C276	2113944A15	CAP CER CHP 3.9PF 50V +/- 0.25PF
C281	2113945A04	CAP CER CHP 390PF 50V 10%
C282	2115153H16	CAP, CERAMIC, COG
C283	2113945A04	CAP CER CHP 390PF 50V 10%
C284	2113945A04	CAP CER CHP 390PF 50V 10%
C285	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C286	2113944A23	CAP CER CHP 8.2PF 50V +/- 0.5PF
C290	2113944A21	CAP CER CHP 6.8PF 50V +/- 0.5PF
C291	2113944A78	CAP,FXD,13PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN, 125DEG CMAX,PB
C292	2113945A04	CAP CER CHP 390PF 50V 10%
C293	2113945A05	CAP CER CHP 470PF 50V 10%
C301	2113945A04	CAP CER CHP 390PF 50V 10%
C302	2113945A04	CAP CER CHP 390PF 50V 10%
C303	2313960F04	CAP,FXD,33UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN,125DEG CMAX,303MA
C304	2113945B02	CAP CER CHP 10,000PF 25V 10%
C305	2113944A40	CAP CER CHP 100.0PF 50V 5%
C306	2113945L49	CAP,FXD,.01UF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX,P
C310	2113945B02	CAP CER CHP 10,000PF 25V 10%
C311	2113945C21	CAP,FXD,.018UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMA
C312	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN,125DEG CMAX,174MA
C313	2113945B02	CAP CER CHP 10,000PF 25V 10%
C314	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C315	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C316	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C320	2113945C21	CAP,FXD,.018UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMA
C321	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C322	2113945B02	CAP CER CHP 10,000PF 25V 10%
C323	2113944A42	CAP CER CHP 150.0PF 50V 5%
C331	2113945B02	CAP CER CHP 10,000PF 25V 10%
C333	2113945B02	CAP CER CHP 10,000PF 25V 10%
C334	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C400	NOT PLACED	64AM DUMMY PART NUMBER
C401	2113946K02	CAP CER CHP 0.10UF 16V
C402	2113945A09	CAP CER CHP 1000PF 50V 10%
C403	2113944A40	CAP CER CHP 100.0PF 50V 5%
C404	2113945A09	CAP CER CHP 1000PF 50V 10%
C405	2113944A40	CAP CER CHP 100.0PF 50V 5%
C406	2113944A40	CAP CER CHP 100.0PF 50V 5%
C407	2113945A09	CAP CER CHP 1000PF 50V 10%
C408	2113945A09	CAP CER CHP 1000PF 50V 10%
C409	2113945A09	CAP CER CHP 1000PF 50V 10%
C410	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN,125DEG CMAX,174MA
C411	2113946K02	CAP CER CHP 0.10UF 16V
C412	2113945A09	CAP CER CHP 1000PF 50V 10%
C413	2113946K02	CAP CER CHP 0.10UF 16V
C414	2113946K02	CAP CER CHP 0.10UF 16V
C415	2113945A09	CAP CER CHP 1000PF 50V 10%
C416	2113945A09	CAP CER CHP 1000PF 50V 10%

Circuit Ref	Motorola Part No.	Description
C417	2113945A09	CAP CER CHP 1000PF 50V 10%
C418	2113946K02	CAP CER CHP 0.10UF 16V
C419	2113945A09	CAP CER CHP 1000PF 50V 10%
C420	2113945B02	CAP CER CHP 10,000PF 25V 10%
C421	2113945B02	CAP CER CHP 10,000PF 25V 10%
C422	2113945B02	CAP CER CHP 10,000PF 25V 10%
C425	2113946E02	CAP CER CHP 1.0UF 16V 10%
C426	2313960B01	CAP,FXD,1UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,87MA,E
C430	2113946K02	CAP CER CHP 0.10UF 16V
C431	2113945A09	CAP CER CHP 1000PF 50V 10%
C432	2113946K02	CAP CER CHP 0.10UF 16V
C433	2113945A09	CAP CER CHP 1000PF 50V 10%
C440	2113945B02	CAP CER CHP 10,000PF 25V 10%
C441	2113945B02	CAP CER CHP 10,000PF 25V 10%
C442	2113945B02	CAP CER CHP 10,000PF 25V 10%
C443	2113945B02	CAP CER CHP 10,000PF 25V 10%
C444	2113945B02	CAP CER CHP 10,000PF 25V 10%
C445	2113945B02	CAP CER CHP 10,000PF 25V 10%
C446	2113945B02	CAP CER CHP 10,000PF 25V 10%
C447	2113946K02	CAP CER CHP 0.10UF 16V
C451	2113946K02	CAP CER CHP 0.10UF 16V
C452	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C453	2313960B30	CAP,FXD,4.7UF,+10%,-10%, 10V-DC,SM,-55DEG CMIN, 125DEG CMAX,122MA
C454	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C455	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C456	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C457	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C458	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C459	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C460	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C461	2113946F03	CAP CER CHP 4.7UF 6.3V 10%
C462	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C463	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C464	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C465	2113945A09	CAP CER CHP 1000PF 50V 10%
C466	NOT PLACED	64AM DUMMY PART NUMBER
C467	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C470	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C471	2113946N03	CAP CER CHP 2.2UF 16V
C472	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C473	2113944A42	CAP CER CHP 150.0PF 50V 5%
C474	2113944A42	CAP CER CHP 150.0PF 50V 5%
C475	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C476	2113945B04	CAP,FXD,.022UF,+10%,-10%, 25V-DC,0402,X7R,-55DEG CMIN,125DEG CMA
C477	2113946K02	CAP CER CHP 0.10UF 16V
C478	2113944A42	CAP CER CHP 150.0PF 50V 5%
C479	2113944A42	CAP CER CHP 150.0PF 50V 5%
C480	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C481	NOT PLACED	64AM DUMMY PART NUMBER
C482	NOT PLACED	64AM DUMMY PART NUMBER
C483	2113946C02	CAP CER CHP 0.22UF 10V 10%
C484	NOT PLACED	64AM DUMMY PART NUMBER
C488	2113945A05	CAP CER CHP 470PF 50V 10%
C489	2113945A05	CAP CER CHP 470PF 50V 10%
C490	2113945A05	CAP CER CHP 470PF 50V 10%
C492	2113955E37	CAP,FXD,10UF,+10%,-10%, 16V-DC,1210,X7R,-55DEG CMIN,125DEG CMAX
C493	2113945A09	CAP CER CHP 1000PF 50V 10%
C494	2113946N03	CAP CER CHP 2.2UF 16V
C495	2113946N02	CAP CER CHP 1.0UF 16V
C496	2113946N02	CAP CER CHP 1.0UF 16V
C497	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C498	2113946N02	CAP CER CHP 1.0UF 16V
C499	2113944A32	CAP CER CHP 39.0PF 50V 5%
C500	2113945A09	CAP CER CHP 1000PF 50V 10%
C501	2113946N02	CAP CER CHP 1.0UF 16V
C503	2113945A09	CAP CER CHP 1000PF 50V 10%
C504	2113945A09	CAP CER CHP 1000PF 50V 10%
C505	2113945A09	CAP CER CHP 1000PF 50V 10%
C506	2113945A09	CAP CER CHP 1000PF 50V 10%
C507	2113945A09	CAP CER CHP 1000PF 50V 10%
C511	2113944C02	CAP CER CHP 220.0PF 50V 5%
C512	2113944A21	CAP CER CHP 6.8PF 50V +/- 0.5PF
C513	2113944C02	CAP CER CHP 220.0PF 50V 5%
C514	2113944A79	CAP,FXD,16PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C518	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C519	2113946N02	CAP CER CHP 1.0UF 16V
C521	2115153H15	CAP, CERAMIC, COG
C522	2115153H11	CAP, CERAMIC, COG
C523	2186463Z04	CAP, NPO, 0.55 +/- 0.03 PF
C524	2186463Z05	CAP, NPO, 0.60 +/- 0.03 PF
CR1	4813974A19	DIODE ARRAY,MXR,SM, SOT-323,7V,.2W,SHTK,2, PB-FREE
CR41	4815923H01	SCHOTTKY DIODE-NEW LEADFREE
CR51	4813974A19	DIODE ARRAY,MXR,SM, SOT-323,7V,.2W,SHTK,2, PB-FREE
D51	4815047H01	BAND SWITCHIND DIODE,ROHM DAN
D52	4815047H01	BAND SWITCHIND DIODE,ROHM DAN
D120	4880973Z02	PIN DIODE
D121	4880973Z02	PIN DIODE
D122	4813978C06	DIODE ARRAY,SIGNL/SWG, BD2836,SM,SOT-23,100MA, 75V,.225W,SHTK,2,PB
D201	4815072H01	DIODE VARACTOR
D220	4815011H01	DIODE TRIPLE
D221	4815011H01	DIODE TRIPLE
D251	4885055Y01	DIODE VARACTOR PB-FREE
D261	4885055Y01	DIODE VARACTOR PB-FREE
D262	4885055Y01	DIODE VARACTOR PB-FREE
D301	4815713H01	DIODE SCHOTTKY 1A 20V PWRMITE
D414	4816064H01	SOT SMBD1022 RH29M19 LH PB-FREE
D424	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D425	4816064H01	SOT SMBD1022 RH29M19 LH PB-FREE
D440	4805729G49	DIODE RED/YEL

Circuit Ref	Motorola Part No.	Description
D470	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D471	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D491	NOT PLACED	64AM DUMMY PART NUMBER
E451	2480640Z01	SURFACE MOUNT FERRITE BEAD
E452	2480640Z01	SURFACE MOUNT FERRITE BEAD
E453	2480640Z01	SURFACE MOUNT FERRITE BEAD
E500	2480640Z01	SURFACE MOUNT FERRITE BEAD
F301	6515076H01	FUSE CHIP SMT TR/1608FF 3A
FL51	9180022M11	XTAL FILTER 44.85MHZ
FL52	9180468V04	SMD455KHZ 4 ELEMENT CER FLTR
FL53	9115811H03	SMD455KHZ 6 ELEMENT
FL54	9115811H01	SMD455KHZ 6 ELEMENT
J140	0986428Z02	CONNECTOR, RF
J301	0986565Z02	CONNECTOR CONTACT BATTERY
J460	0986615Z02	CONN,ZIF,F,28CONT,,TIN,,,CBL
J470	0985818A02	CONNECTOR, MICROPHONE, 2-PIN
J471	0980683Z03	AUDIO JACK (MONO & STEREO)
J491	2815162H01	HEADER SMT HORZ MOUNT LEAD-FREE
L1	2415428H08	AIR WOUND INDUCTOR
L2	2415428H08	AIR WOUND INDUCTOR
L3	2415428H08	AIR WOUND INDUCTOR
L21	2414017N17	IDCTR,CHIP,27NH,5%,600MA,.62OHM,CER,12 Q,1.2GHZ SRF,SM,0603
L31	2415428H08	AIR WOUND INDUCTOR
L32	2415428H08	AIR WOUND INDUCTOR
L33	2415428H08	AIR WOUND INDUCTOR
L34	2415428H08	AIR WOUND INDUCTOR
L40	2414017K16	IDCTR,CHIP,27NH,5%,300MA,.3OHM,CER,16 Q,1.1GHZ SRF,SM,0805,P
L41	2414017K16	IDCTR,CHIP,27NH,5%,300MA,.3OHM,CER,16 Q,1.1GHZ SRF,SM,0805,P
L51	2414017N26	IDCTR,CHIP,150NH,5%,200MA,2.4OHM,CER,11 Q,550MHZ SRF,SM,0603
L52	2414032F44	IDCTR,WW,680NH,10%,130MA,4OHM,CER,30 Q,570MHZ SRF,SM,LEAD-F
L53	2113944A41	CAP CER CHP 120.0PF 50V 5%
L54	2414015A25	IDCTR,FXD,1.2UH,2%,440MA,2OHM,CER,20 Q,200MHZ SRF,SM,1008,PB
L55	2414017N15	IDCTR,CHIP,18NH,5%,600MA,.47OHM,CER,12 Q,1.5GHZ SRF,SM,0603
L81	2414015A19	IDCTR,FXD,1UH,2%,460MA,1.75OHM,CER,33 Q,290MHZ SRF,SM,1008,P
L100	2414017K27	IDCTR,CHIP,220NH,5%,200MA,1.2OHM,CER,16 Q,300MHZ SRF,SM,0805
L101	2414017K27	IDCTR,CHIP,220NH,5%,200MA,1.2OHM,CER,16 Q,300MHZ SRF,SM,0805
L102	2415429H13	CHIP INDUCTOR
L103	2415429H25	CHIP INDUCTOR
L110	2414017K27	IDCTR,CHIP,220NH,5%,200MA,1.2OHM,CER,16 Q,300MHZ SRF,SM,0805
L120	2414017K27	IDCTR,CHIP,220NH,5%,200MA,1.2OHM,CER,16 Q,300MHZ SRF,SM,0805
L121	2414032F25	IDCTR,WW,18NH,5%,600MA,.2OHM,CER,45 Q,2.4GHZ SRF,SM,PB-FREE
L130	2460591M27	COIL AIR WOUND INDUC 22.69
L131	2460591M32	COIL AIR WOUND INDUC 27.42
L132	2460591M27	COIL AIR WOUND INDUC 22.69
L140	2113944C05	CAP CER CHP 390.0PF 50V 5%
L141	2460591M27	COIL AIR WOUND INDUC 22.69
L211	2414017K30	IDCTR,CHIP,390NH,5%,150MA,1.8OHM,CER,11Q,200MHZSRF,SM,0805,P
L251	2414017N28	IDCTR,CHIP,220NH,5%,150MA,3OHM,CER,11 Q,450MHZ SRF,SM,0603,P
L252	2414017N17	IDCTR,CHIP,27NH,5%,600MA,.62OHM,CER,12 Q,1.2GHZ SRF,SM,0603
L254	2415385H02	COIL SURFACE MOUNT AIR WOUND
L255	2414017N28	IDCTR,CHIP,220NH,5%,150MA,3OHM,CER,11 Q,450MHZ SRF,SM,0603,P
L262	2414017N17	IDCTR,CHIP,27NH,5%,600MA,.62OHM,CER,12 Q,1.2GHZ SRF,SM,0603
L264	2415385H02	COIL SURFACE MOUNT AIR WOUND
L265	2414017N28	IDCTR,CHIP,220NH,5%,150MA,3OHM,CER,11 Q,450MHZ SRF,SM,0603,P
L270	2414017N28	IDCTR,CHIP,220NH,5%,150MA,3OHM,CER,11 Q,450MHZ SRF,SM,0603,P
L271	NOT PLACED	64AM DUMMY PART NUMBER
L272	2414017N28	IDCTR,CHIP,220NH,5%,150MA,3OHM,CER,11 Q,450MHZ SRF,SM,0603,P
L276	2414017N17	IDCTR,CHIP,27NH,5%,600MA,.62OHM,CER,12 Q,1.2GHZ SRF,SM,0603
L281	2414017N18	IDCTR,CHIP,33NH,5%,600MA,.71OHM,CER,12 Q,1.1GHZ SRF,SM,0603
L282	2414017N14	IDCTR,CHIP,15NH,5%,600MA,.4OHM,CER,12 Q,1.8GHZ SRF,SM,0603,P
L283	NOT PLACED	64AM DUMMY PART NUMBER
L291	2414017N10	IDCTR,CHIP,6.8NH,5%,600MA,.22OHM,CER,10 Q,2.7GHZ SRF,SM,0603
L292	2414017N14	IDCTR,CHIP,15NH,5%,600MA,.4OHM,CER,12 Q,1.8GHZ SRF,SM,0603,P
L471	2414017K30	IDCTR,CHIP,390NH,5%,150MA,1.8OHM,CER,11Q,200MHZSRF,SM,0805,P
M140	0286427Z02	NUT, ANTENNA
PASTE	1085674C03	PASTE/NC-SMQ230
Q21	4802247J01	TSTR,RF SMALL SIGNAL,,NPN,,,,,SMT,1
Q22	4815267H01	DBRT UMT1NFTN
Q51	4802197J95	RF TRANSISTOR PBR941
Q70	4813973M07	XSTR,BIP GP SS, NPN, T3904,SM,SOT-23, SMT, 40V, .225W, 200MA, 300MHZ
Q100	4885593U03	TSTR NPN 9GHZ BFG540W
Q150	4813973M07	XSTR,BIP GP SS,NPN, T3904,SM,SOT-23,SMT,40V,.225W,200MA,300MHZ
Q170	4809939C34	TSTR DUAL PNP EMB10T2R EMT6
Q171	4813973A42	XSTR,BIP GP SS,NPN,SM, SC-59,SMT,50V,.23W,100MA, PB-FREE
Q280	4802245J95	BJT, NPN TRANSISTOR
Q311	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q312	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q313	4815066H01	UMG5N DIGITAL TRANSISTOR
Q402	4813973A42	XSTR,BIP GP SS,NPN, SM, SC-59,SMT,50V,.23W,100MA, PB-FREE
Q403	4813973A13	XSTR,GEN PURPOSE SMALL SIG,PNP, MMBT3906L,TO-236,4, PB-FREE
Q410	4815066H01	UMG5N DIGITAL TRANSISTOR
Q425	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q426	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q427	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q440	4815154H01	DUAL TRANS NPN
Q470	4815267H01	DBRT UMT1NFTN
Q471	4815066H01	UMG5N DIGITAL TRANSISTOR
Q472	4815267H01	DBRT UMT1NFTN
Q481	NOT PLACED	64AM DUMMY PART NUMBER
Q482	NOT PLACED	64AM DUMMY PART NUMBER
Q490	4815066H01	UMG5N DIGITAL TRANSISTOR
Q493	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q494	4815066H01	UMG5N DIGITAL TRANSISTOR
Q520	4815154H01	DUAL TRANS NPN

Circuit Ref	Motorola Part No.	Description
R20	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R21	0613952Q46	CER CHIP RES 75.0 OHM 5% 0402
R22	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R23	0613952R11	CER CHIP RES 27K OHM 5% 0402
R24	0613952Q75	CER CHIP RES 1200 OHM 5% 0402
R25	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R40	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R51	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R52	0613952R03	CER CHIP RES 12K OHM 5% 0402
R53	0613952R13	CER CHIP RES 33K OHM 5% 0402
R54	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R55	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R57	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R60	0613952Q82	CER CHIP RES 2400 OHM 5% 0402
R61	0613952R25	CER CHIP RES 100K OHM 5% 0402
R62	0613952Q85	CER CHIP RES 3300 OHM 5% 0402
R63	0613952R15	CER CHIP RES 39K OHM 5% 0402
R64	0613952R08	CER CHIP RES 20K OHM 5% 0402
R65	0613952R15	CER CHIP RES 39K OHM 5% 0402
R66	0613952R08	CER CHIP RES 20K OHM 5% 0402
R67	0613952R08	CER CHIP RES 20K OHM 5% 0402
R72	0613952Q63	CER CHIP RES 390 OHM 5% 0402
R73	0613952Q79	CER CHIP RES 1800 OHM 5% 0402
R74	0613952Q75	CER CHIP RES 1200 OHM 5% 0402
R75	0613952R03	CER CHIP RES 12K OHM 5% 0402
R76	0613952Z55	RES,MF,12KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R77	0613952Z53	RES,MF,8.2KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R78	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R80	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R81	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R82	NOT PLACED	64AM DUMMY PART NUMBER
R90	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R91	0613952Q78	CER CHIP RES 1600 OHM 5% 0402
R92	NOT PLACED	64AM DUMMY PART NUMBER
R93	NOT PLACED	64AM DUMMY PART NUMBER
R100	0613952Q71	CER CHIP RES 820 OHM 5% 0402
R101	0613952Q19	CER CHIP RES 5.6 OHM 5% 0402
R102	0613952Q71	CER CHIP RES 820 OHM 5% 0402
R103	0613952Q84	CER CHIP RES 3000 OHM 5% 0402
R104	0613952H31	CER CHIP RES 18.0 OHM 5% 0603
R105	0613952Q83	CER CHIP RES 2700 OHM 5% 0402
R106	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R107	NOT PLACED	64AM DUMMY PART NUMBER
R110	0613952Q66	CER CHIP RES 510 OHM 5% 0402
R111	0613952Q79	CER CHIP RES 1800 OHM 5% 0402
R120	0613958H53	CER CHIP RES 150 OHM 5% 0805
R121	0613958H53	CER CHIP RES 150 OHM 5% 0805
R150	0615043C01	RES POWER METAL STRIP W18 COMPLIANT
R151	0613952H39	CER CHIP RES 39.0 OHM 5% 0603
R152	0613952P01	CER CHIP RES 100K OHM 1% 0402
R153	0613952P01	CER CHIP RES 100K OHM 1% 0402
R154	0613952P01	CER CHIP RES 100K OHM 1% 0402
R155	0613952P01	CER CHIP RES 100K OHM 1% 0402
R156	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R157	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R158	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R159	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
R162	0613952R01	CER CHIP RES 10K OHM 5% 0402
R202	0613952R29	CER CHIP RES 150K OHM 5% 0402
R205	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R206	NOT PLACED	64AM DUMMY PART NUMBER
R212	0613958J74	CER CHIP RES 0.0 OHM JMP 0805
R220	0613952Q33	CER CHIP RES 22.0 OHM 5% 0402
R221	0613952Q33	CER CHIP RES 22.0 OHM 5% 0402
R223	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R227	0613952R15	CER CHIP RES 39K OHM 5% 0402
R230	0613952R10	CER CHIP RES 24K OHM 5% 0402
R243	0613952Q71	CER CHIP RES 820 OHM 5% 0402
R244	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R245	0613952Q77	CER CHIP RES 1500 OHM 5% 0402
R246	0613952R25	CER CHIP RES 100K OHM 5% 0402
R247	0613952R11	CER CHIP RES 27K OHM 5% 0402
R253	0613952Q37	CER CHIP RES 33.0 OHM 5% 0402
R254	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R255	0613952Z46	RES,MF,3.9KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R261	0613952R09	CER CHIP RES 22K OHM 5% 0402
R262	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R263	0613952Q37	CER CHIP RES 33.0 OHM 5% 0402
R264	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R271	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R272	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R273	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R274	0613952Q37	CER CHIP RES 33.0 OHM 5% 0402
R275	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R276	NOT PLACED	64AM DUMMY PART NUMBER
R277	0613952G67	CER CHIP RES 0.0 +/-0.050 OHM
R280	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R281	0613952Q95	CER CHIP RES 8200 OHM 5% 0402
R282	0613952Q72	CER CHIP RES 910 OHM 5% 0402
R283	0613952Q52	CER CHIP RES 130 OHM 5% 0402
R284	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R285	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R310	0613952R25	CER CHIP RES 100K OHM 5% 0402
R311	0613952R25	CER CHIP RES 100K OHM 5% 0402
R312	0613952R08	CER CHIP RES 20K OHM 5% 0402
R313	0613952R01	CER CHIP RES 10K OHM 5% 0402
R320	0613952Z80	RES,MF,330KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R321	0613952P30	CER CHIP RES 200K OHM 1% 0402

Circuit Ref	Motorola Part No.	Description
R322	0613952R25	CER CHIP RES 100K OHM 5% 0402
R400	NOT PLACED	64AM DUMMY PART NUMBER
R401	0613952R36	CER CHIP RES 300K OHM 5% 0402
R402	0613952R01	CER CHIP RES 10K OHM 5% 0402
R403	0613952R01	CER CHIP RES 10K OHM 5% 0402
R404	0613952R18	CER CHIP RES 51K OHM 5% 0402
R405	0613952R36	CER CHIP RES 300K OHM 5% 0402
R406	0613952R33	CER CHIP RES 220K OHM 5% 0402
R407	0613952R25	CER CHIP RES 100K OHM 5% 0402
R408	0613952R25	CER CHIP RES 100K OHM 5% 0402
R409	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R410	0613952R01	CER CHIP RES 10K OHM 5% 0402
R411	0613952Q71	CER CHIP RES 820 OHM 5% 0402
R412	0613952R25	CER CHIP RES 100K OHM 5% 0402
R413	0613952R25	CER CHIP RES 100K OHM 5% 0402
R414	0613952R13	CER CHIP RES 33K OHM 5% 0402
R415	0613952R13	CER CHIP RES 33K OHM 5% 0402
R416	0613952R08	CER CHIP RES 20K OHM 5% 0402
R417	0613952R01	CER CHIP RES 10K OHM 5% 0402
R418	0613952R25	CER CHIP RES 100K OHM 5% 0402
R419	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R420	0613952P30	CER CHIP RES 200K OHM 1% 0402
R421	0613952P01	CER CHIP RES 100K OHM 1% 0402
R422	0613952R25	CER CHIP RES 100K OHM 5% 0402
R423	0613952R25	CER CHIP RES 100K OHM 5% 0402
R424	0613952P30	CER CHIP RES 200K OHM 1% 0402
R425	0613952P01	CER CHIP RES 100K OHM 1% 0402
R430	0613952R25	CER CHIP RES 100K OHM 5% 0402
R431	NOT PLACED	64AM DUMMY PART NUMBER
R432	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R433	0613952R25	CER CHIP RES 100K OHM 5% 0402
R434	NOT PLACED	64AM DUMMY PART NUMBER
R440	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R441	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R442	0613952H57	CER CHIP RES 220 OHM 5% 0603
R443	0613952H51	CER CHIP RES 120 OHM 5% 0603
R445	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R446	0613952R01	CER CHIP RES 10K OHM 5% 0402
R451	0613952R17	CER CHIP RES 47K OHM 5% 0402
R460	0613952R10	CER CHIP RES 24K OHM 5% 0402
R462	0613952R10	CER CHIP RES 24K OHM 5% 0402
R463	0613952R10	CER CHIP RES 24K OHM 5% 0402
R464	0613952R12	CER CHIP RES 30K OHM 5% 0402
R469	0613952Q25	CER CHIP RES 10.0 OHM 5% 0402
R470	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R471	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R472	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R473	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R474	0613952H61	CER CHIP RES 330 OHM 5% 0603
R475	0613952R31	CER CHIP RES 180K OHM 5% 0402
R476	0613952R25	CER CHIP RES 100K OHM 5% 0402
R477	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R478	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R479	0613952R25	CER CHIP RES 100K OHM 5% 0402
R480	0613952G67	CER CHIP RES 0.0 +/-0.050 OHM
R481	NOT PLACED	64AM DUMMY PART NUMBER
R482	NOT PLACED	64AM DUMMY PART NUMBER
R483	NOT PLACED	64AM DUMMY PART NUMBER
R484	NOT PLACED	64AM DUMMY PART NUMBER
R485	NOT PLACED	64AM DUMMY PART NUMBER
R486	NOT PLACED	64AM DUMMY PART NUMBER
R487	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R488	0613952R37	CER CHIP RES 330K OHM 5% 0402
R489	NOT PLACED	64AM DUMMY PART NUMBER
R490	NOT PLACED	64AM DUMMY PART NUMBER
R491	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R492	0613952R10	CER CHIP RES 24K OHM 5% 0402
R493	0613952R37	CER CHIP RES 330K OHM 5% 0402
R494	0613952Z80	RES,MF,330KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R495	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R496	NOT PLACED	64AM DUMMY PART NUMBER
R497	NOT PLACED	64AM DUMMY PART NUMBER
R498	NOT PLACED	64AM DUMMY PART NUMBER
R499	NOT PLACED	64AM DUMMY PART NUMBER
R501	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R502	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R503	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R504	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R505	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R506	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R507	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R508	0613952R25	CER CHIP RES 100K OHM 5% 0402
R509	0613952R25	CER CHIP RES 100K OHM 5% 0402
R510	0613952R37	CER CHIP RES 330K OHM 5% 0402
R511	0613952R25	CER CHIP RES 100K OHM 5% 0402
R512	0613952R29	CER CHIP RES 150K OHM 5% 0402
R513	0613952R25	CER CHIP RES 100K OHM 5% 0402
R514	0613952R25	CER CHIP RES 100K OHM 5% 0402
R515	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R516	NOT PLACED	64AM DUMMY PART NUMBER
R517	NOT PLACED	64AM DUMMY PART NUMBER
R518	0613952R33	CER CHIP RES 220K OHM 5% 0402
R519	0613952R25	CER CHIP RES 100K OHM 5% 0402
R520	0613952R25	CER CHIP RES 100K OHM 5% 0402
R521	NOT PLACED	64AM DUMMY PART NUMBER
R522	0613952R25	CER CHIP RES 100K OHM 5% 0402
R523	0613952R01	CER CHIP RES 10K OHM 5% 0402
R525	0613952R01	CER CHIP RES 10K OHM 5% 0402
R526	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
S440	4080710Z26	SWITCH, FREQUENCY (EPP)

Circuit Ref	Motorola Part No.	Description
S441	4070354A01	LIGHT TOUCH SWITCH-SMD
S442	4070354A01	LIGHT TOUCH SWITCH-SMD
S443	4070354A01	LIGHT TOUCH SWITCH-SMD
S444	1880619Z06	POTENTIOMETER, VOLUME
SH1	2686421Z02	SHIELD, FE, ELP
SH40	2686419Z02	SHIELD, MIXER, ELP
SH50	2686423Z02	SHIELD, 19 X 19 X 3.03 MM
SH52	2686424Z02	SHIELD, IF, ELP
SH100	2686418Z03	SHEILD, HARMONIC FILTER, ELP
SH200	2686424Z02	SHIELD, IF, ELP
SH201	2686423Z02	SHIELD, 19 X 19 X 3.03 MM
SH250	2686425Z02	SHIELD
SH251	2686425Z02	SHIELD
SH253	2686422Z02	SHIELD, BUFFER, ELP
SH400	2686420Z04	SHIELD, CONTROL, ELP
SH401	2686420Z03	SHIELD,CONTROL,ELP
SP7	1088791Y02	SOLDER PELLETS, LEAD FREE
T41	2515121H01	BALUN, TRANSFORMER W18 COMP
T42	2515121H01	BALUN, TRANSFORMER W18 COMP
U51	5115281H01	FM IF IC SA616 FROM PHILIPS
U52	5115070H01	IC 3-INV LMOS TC7W04FU
U110	0104022J62	ASSEMBLY, PA MODULE UHF1 EPP (NEW)
U150	5114005A01	IC,OP AMP,2PER PKG,GP,SM,SO-8,PB-FREE
U151	2415954H02	INDUCTOR BEAD CHIP EPP WITH EPOXY
U201	5185177Y01	IC TESTED AT25016 48 PIN W18
U251	5171121L01	CUSTOM LOW VOLTAGE VCO BUFFER IC
U310	5115746H01	VOLTAGE REGULATOR, 5V
U320	5115679H01	IC VOLTAGE REGLTR LP2986
U330	5115745H01	VOLTAGE REGULATOR, 3V
U401	5185143E03	HC11FL0 (3V) ASIC MICRO-P
U402	5116648H01	128KBIT SERIAL SPI BUS EEPROM
U403	NOT PLACED	64AM DUMMY PART NUMBER
U404	51012084002	IC FLASH 4MBIT 3.3V 8MM14MM
U425	5115697H01	LOW PWR OP AMP W/RAIL TO RAIL
U451	5115062H01	IC ASFIC_CMP
U480	NOT PLACED	64AM DUMMY PART NUMBER
U490	5116029H01	1 W BTL AUDIO AMPLIFIER
U510	5114005A01	IC,OP AMP,2PER PKG,GP,SM,SO-8,PB-FREE
U511	4815066H01	UMG5N DIGITAL TRANSISTOR
VR110	4813977A59	DIODE,ZEN,MM3Z3V9,SM,SOD-323,3.9V,10MA,.2W,ZEN,PB-FREE
VR301	4813977M29	DIODE,VREF,MBZ5250,SM,SOT-23,20V,.225W,ZEN
VR302	4813977M29	DIODE,VREF,MBZ5250,SM,SOT-23,20V,.225W,ZEN
VR471	4813977M14	DIODE,ZEN,MBZ5235,SM,SOT-23,6.8V,10MA,.225W,ZEN,PB-FREE
VR472	4813977M05	DIODE,ZEN,MBZ5226,SM,SOT-23,3.3V,10MA,.225W,ZEN,PB-FREE
VR473	4813977M29	DIODE,VREF,MBZ5250,SM,SOT-23,20V,.225W,ZEN
VR474	4813977M29	DIODE,VREF,MBZ5250,SM,SOT-23,20V,.225W,ZEN
VR475	4813977M24	DIODE,ZEN,MBZ5245,SM,SOT-23,15V,10MA,.225W,ZEN,PB-FREE
Y51	4802245J84	XTAL 44.395MHZ, 3RD OT, SMD
Y70	9186145B02	CER.DISCR. CDBCA455CX36-TC
Y201	4880114R08	CRYSTAL, QUARTZ 16.8 MHZ
Y202	NOT PLACED	64AM DUMMY PART NUMBER

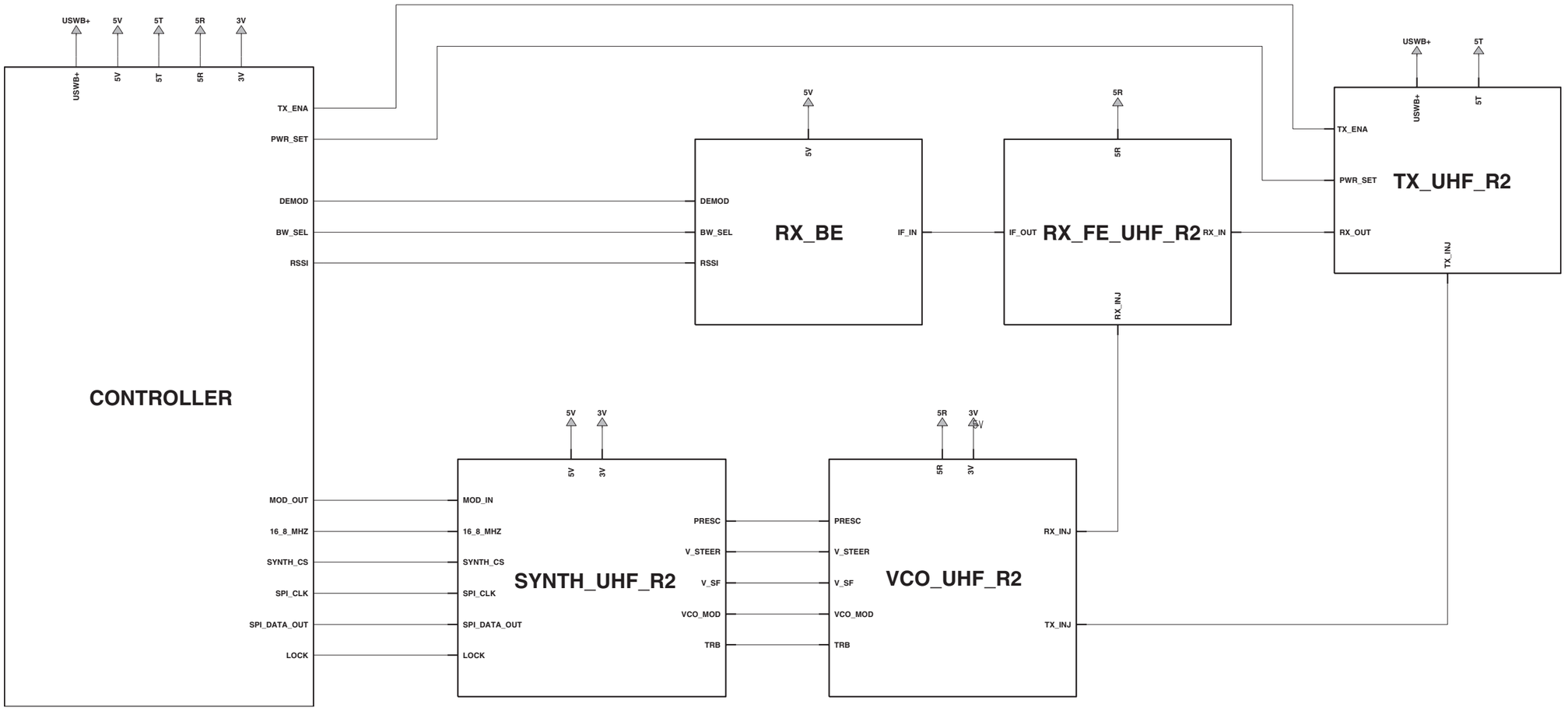


Figure 13-38. UHF (438–470 MHz) Radio Circuit Block Diagram (8486348Z09-A)

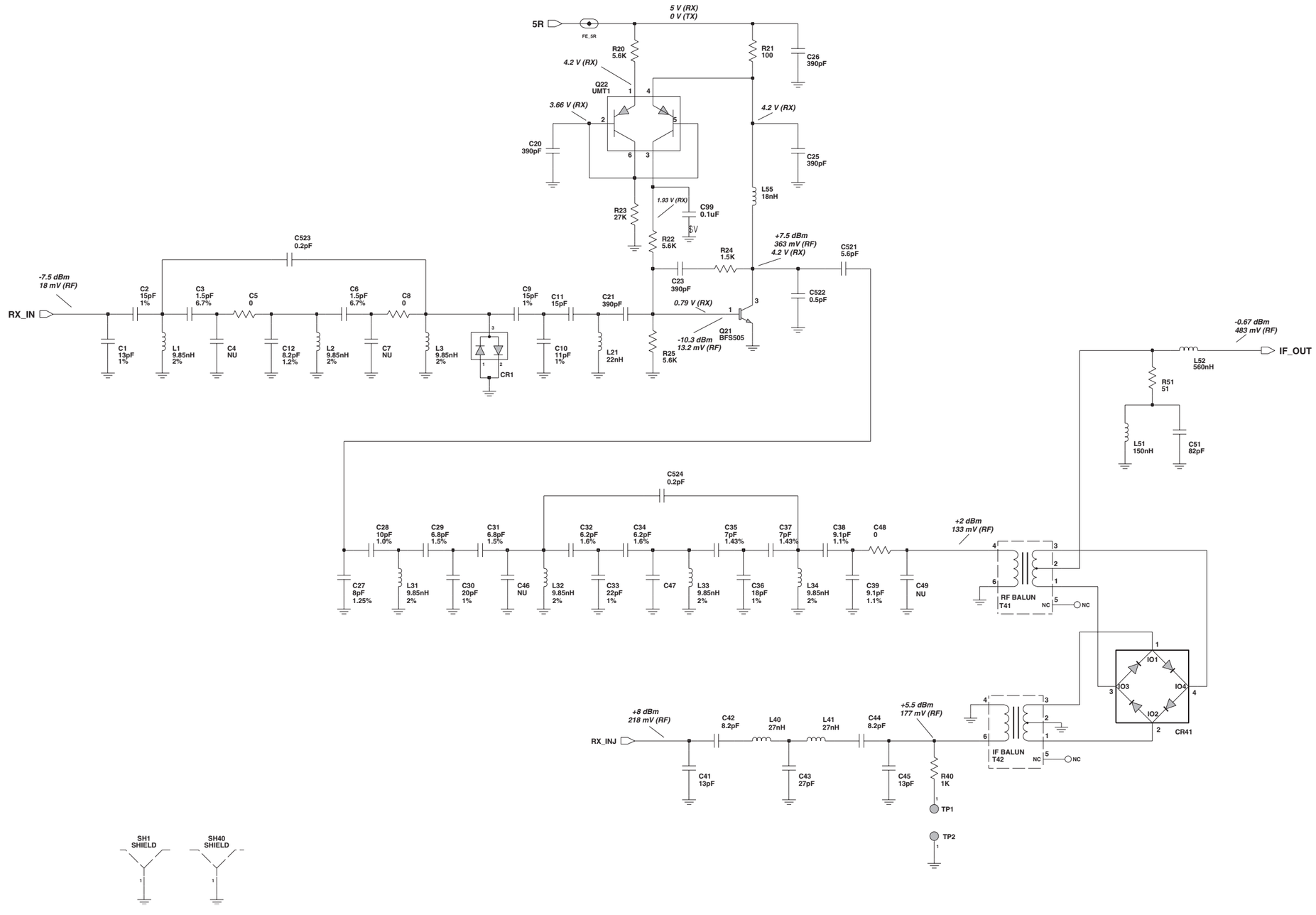


Figure 13-39. UHF (438–470 MHz) Receiver Front End Schematic Diagram (8486348Z09-A)

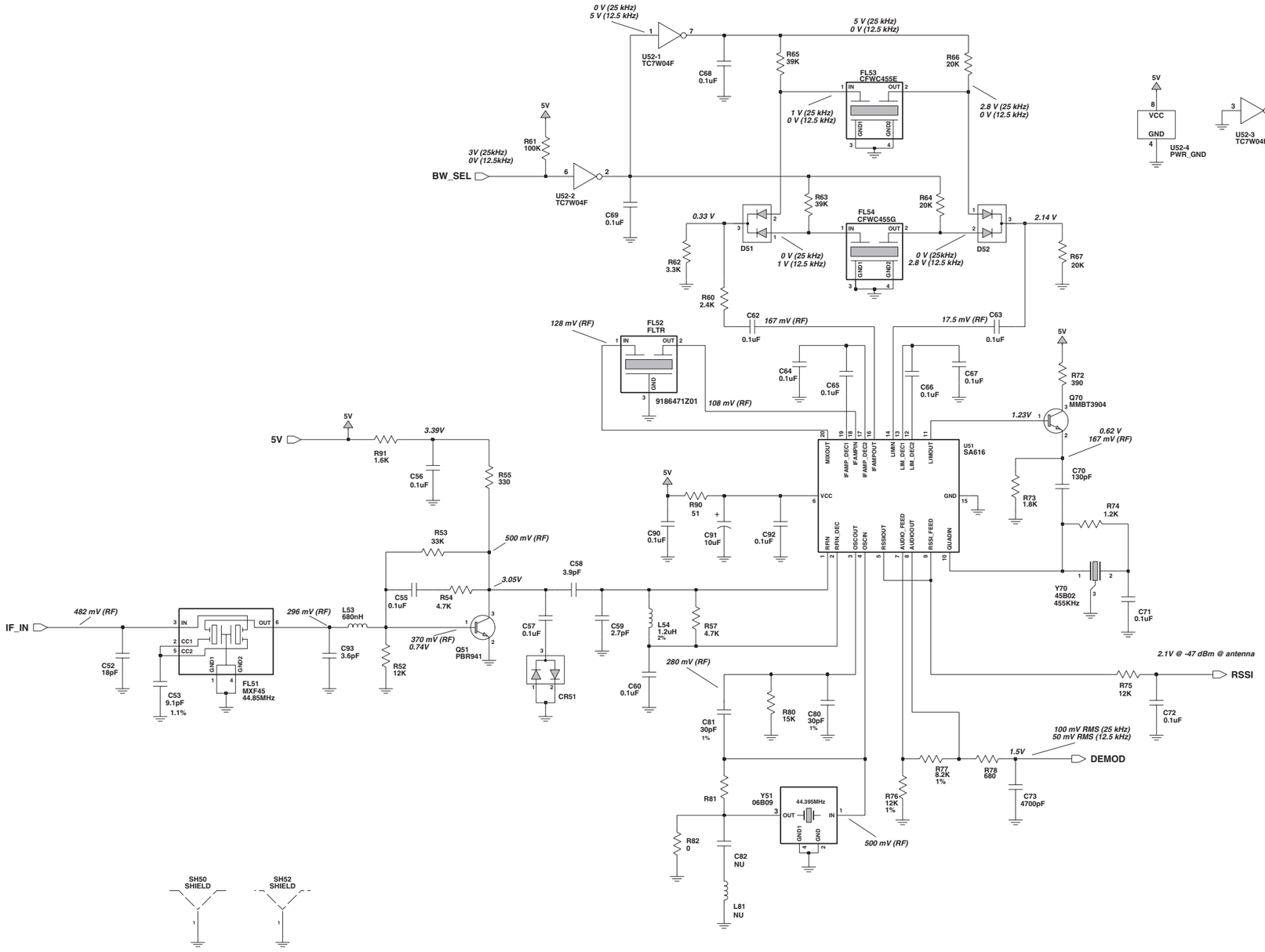


Figure 13-40. UHF (438–470 MHz) Receiver Back End Schematic Diagram (8486348Z09-A)

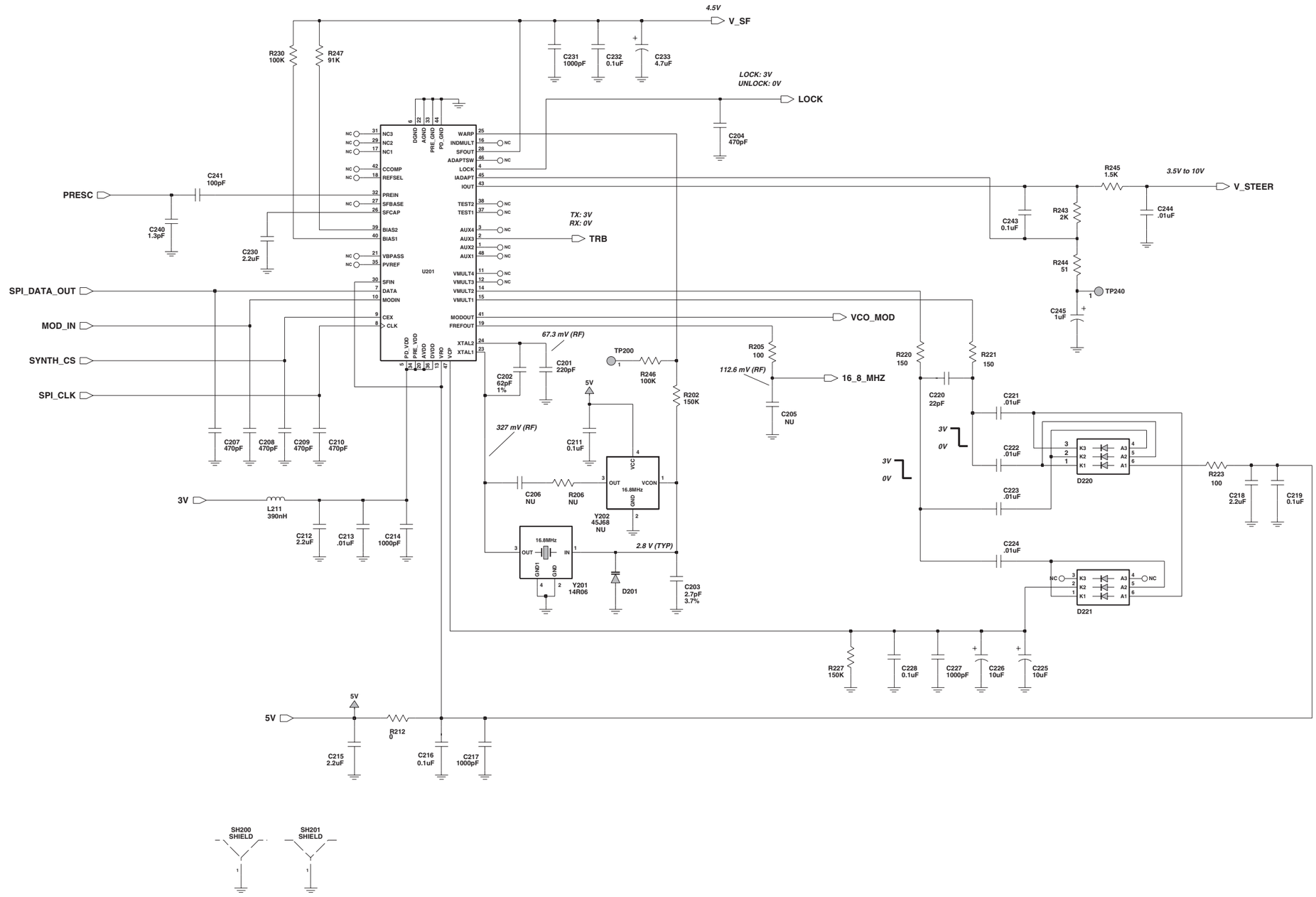


Figure 13-41. UHF (438–470 MHz) Synthesizer Schematic Diagram (8486348Z09-A)

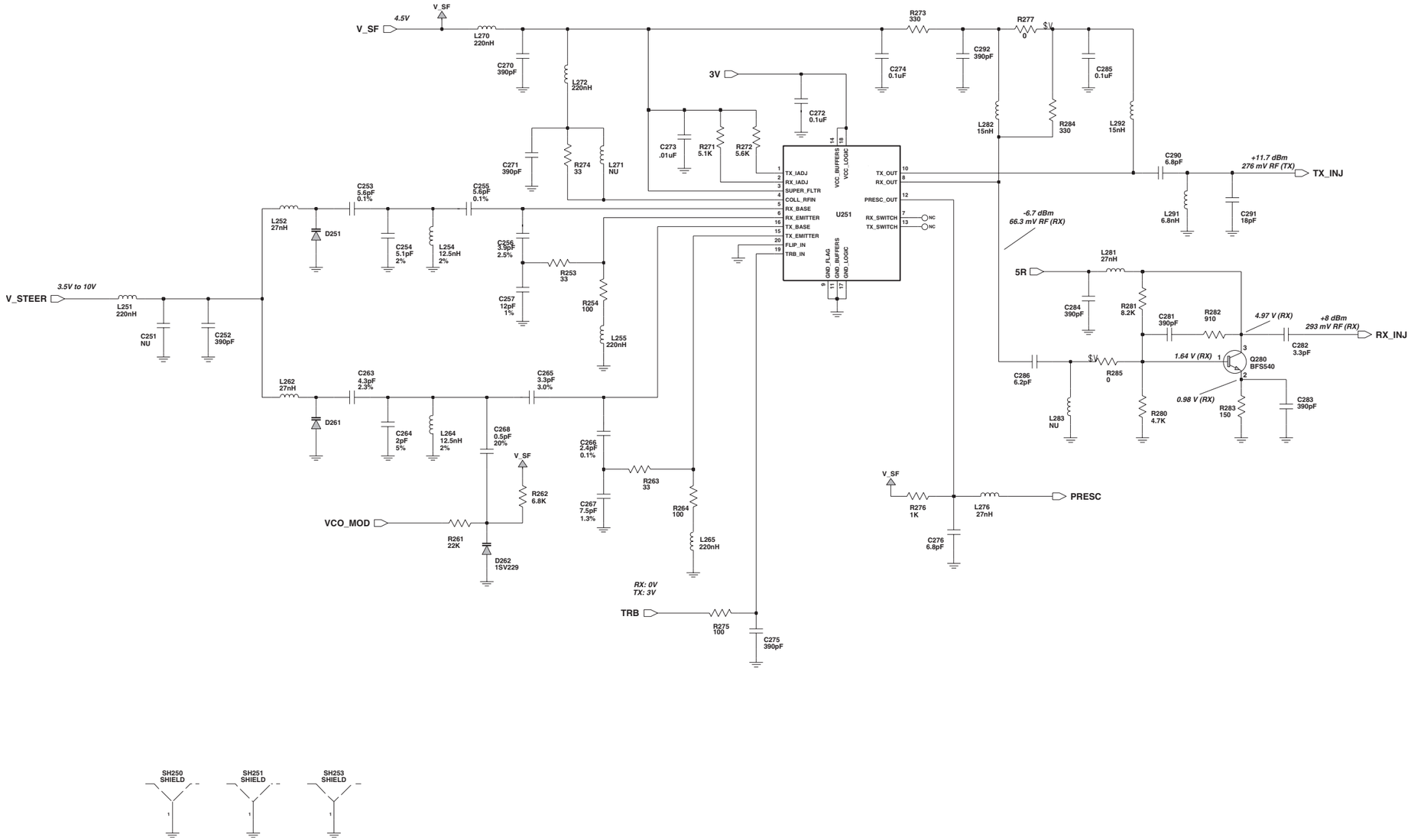


Figure 13-42. UHF (438–470 MHz) Voltage Controlled Oscillator Schematic Diagram (8486348Z09-A)

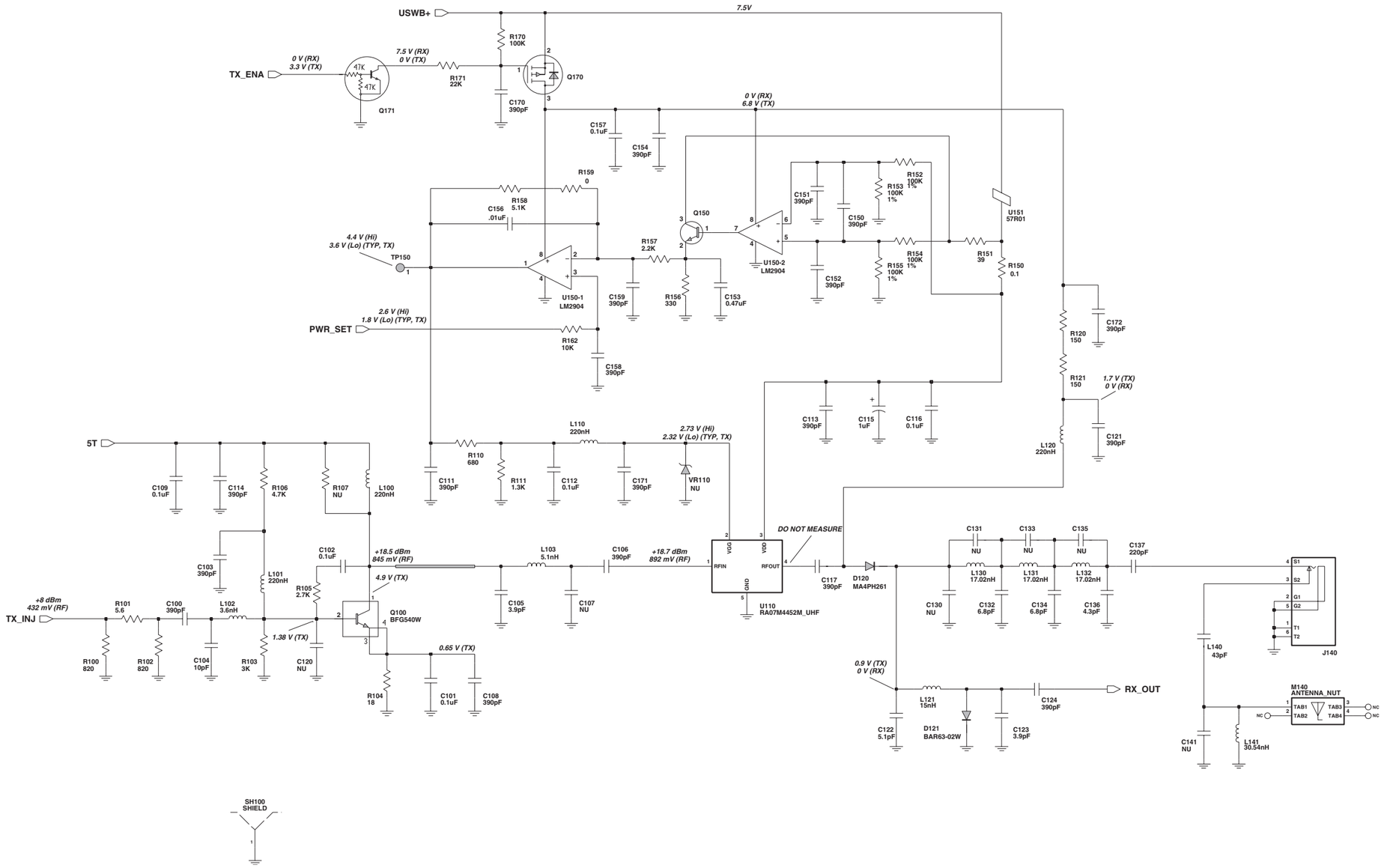


Figure 13-43. UHF (438–470 MHz) Transmitter and Power Control Schematic Diagram (8486348Z09-A)

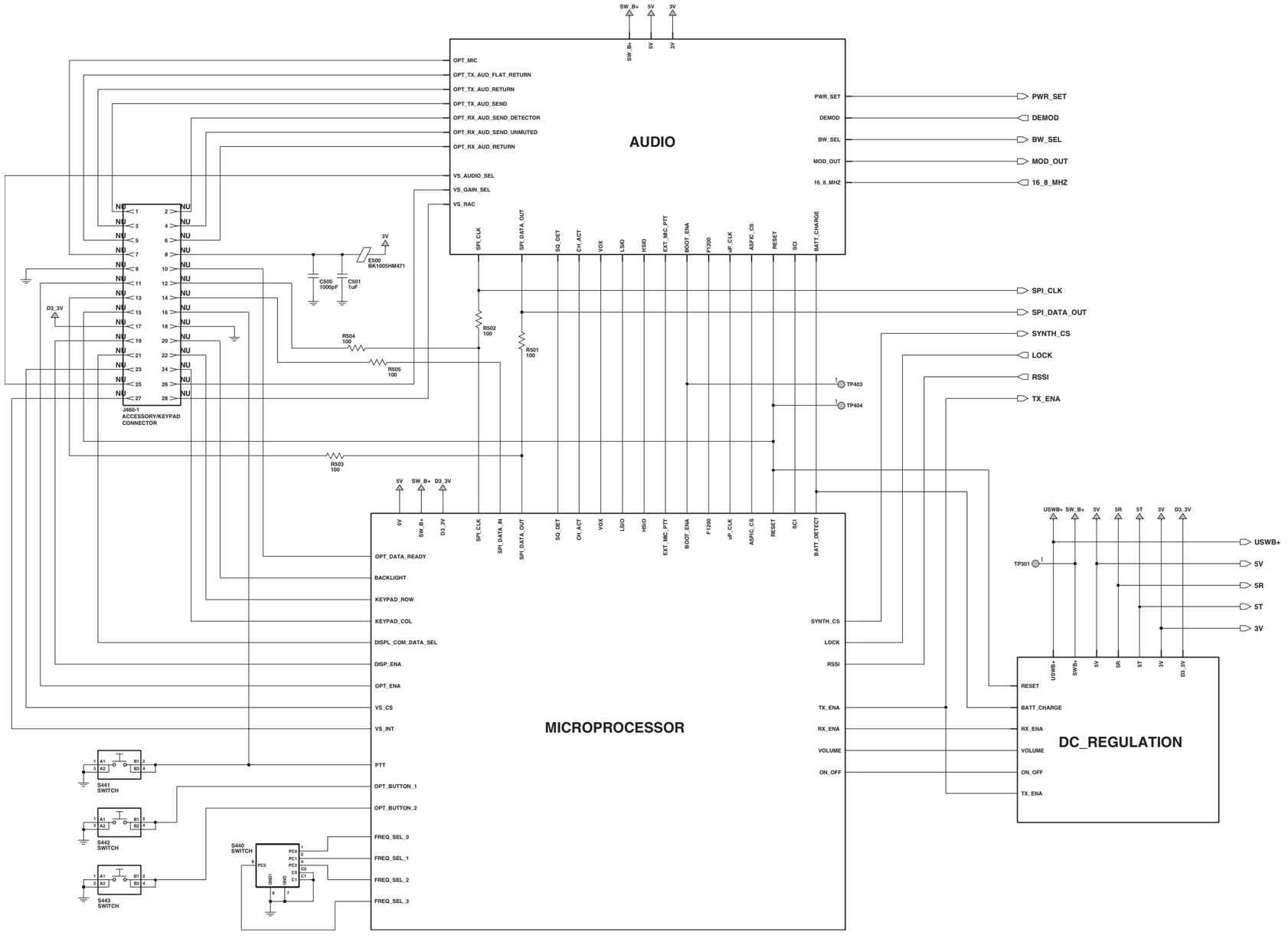


Figure 13-44. UHF (438–470 MHz) Controller Interconnect Schematic Diagram (8486348Z09-A)

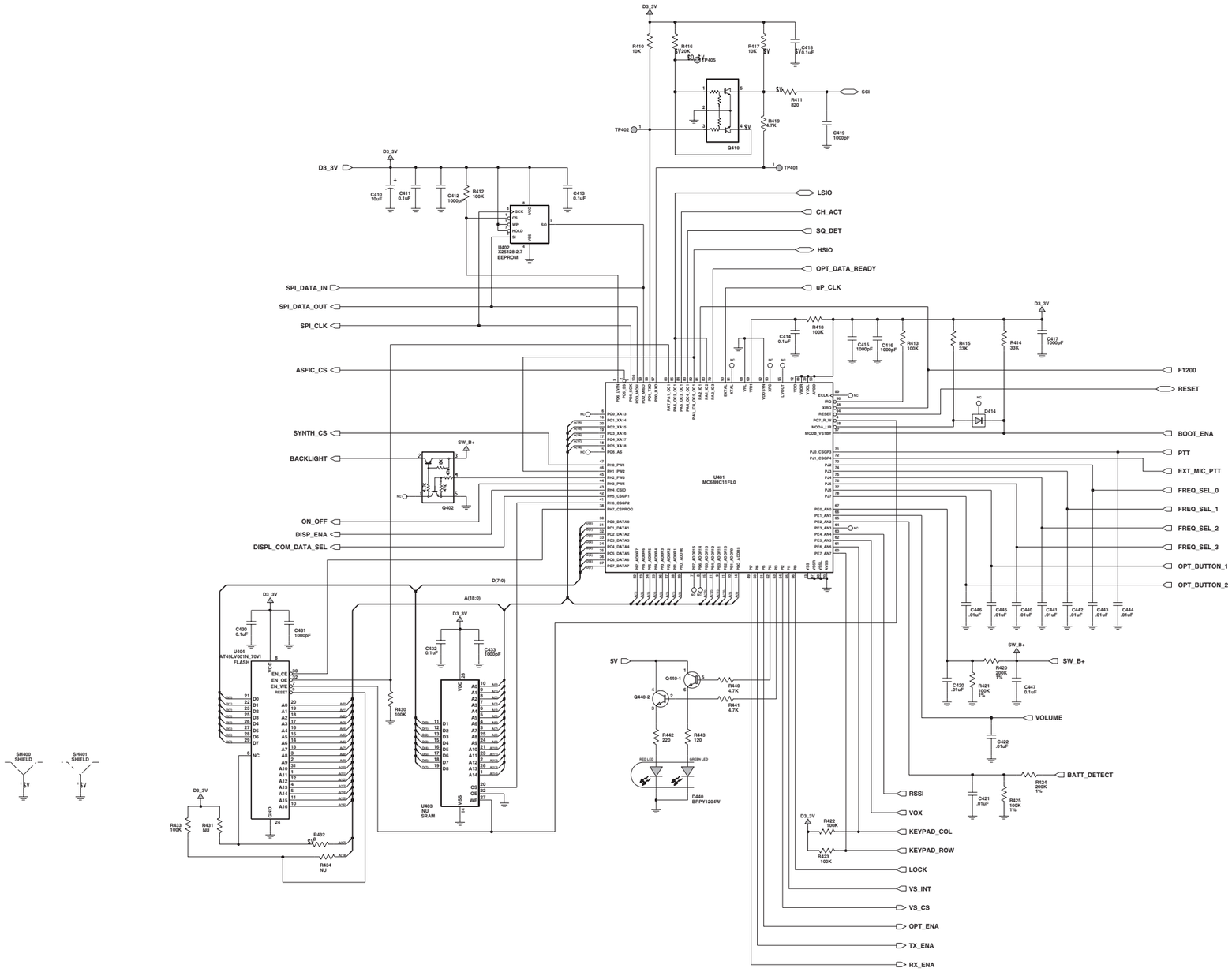


Figure 13-45. UHF (438–470 MHz) Microprocessor Circuitry Schematic Diagram (8486348Z09-A)

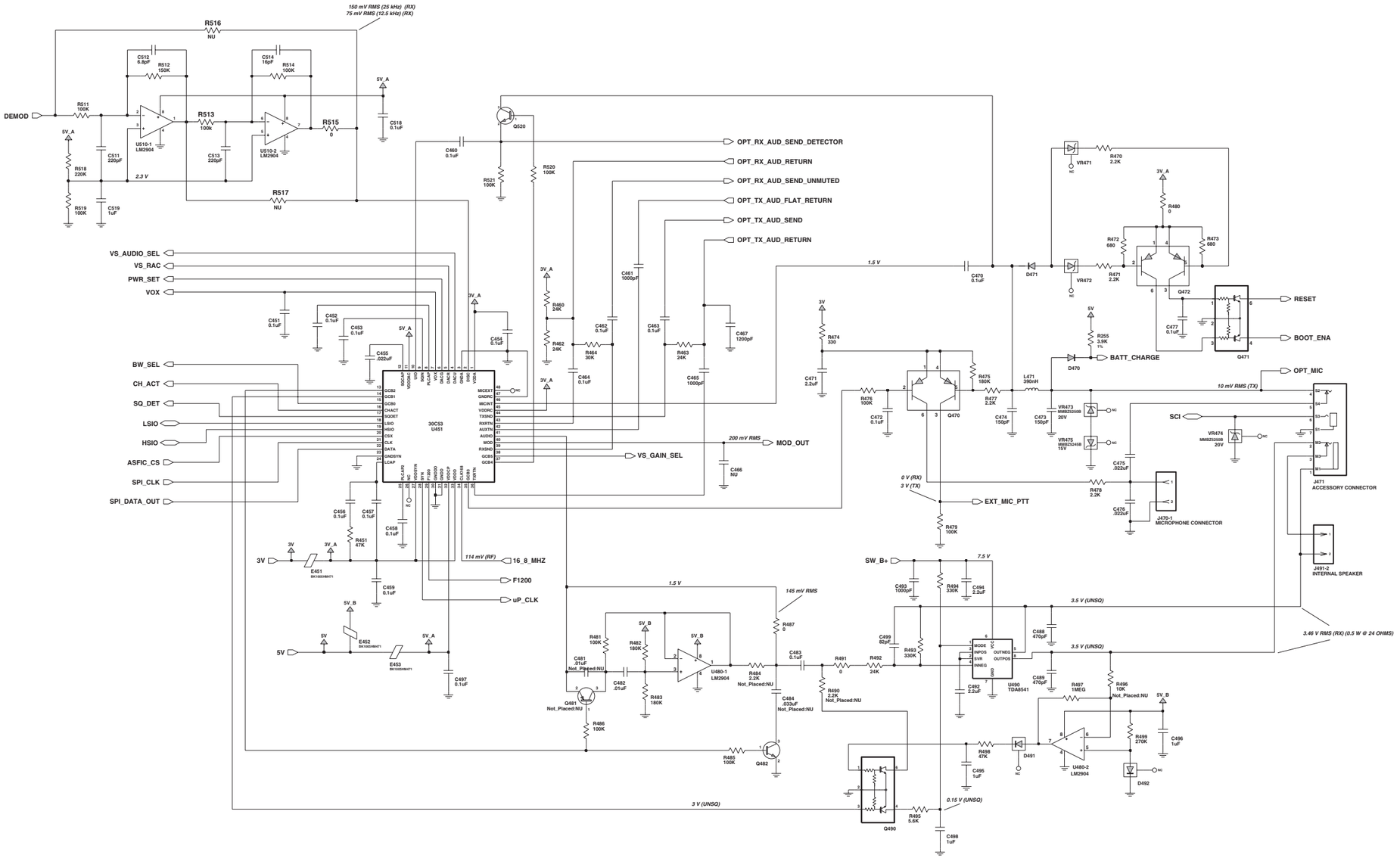


Figure 13-46. UHF (438–470 MHz) Audio Circuitry Schematic Diagram (8486348Z09-A)

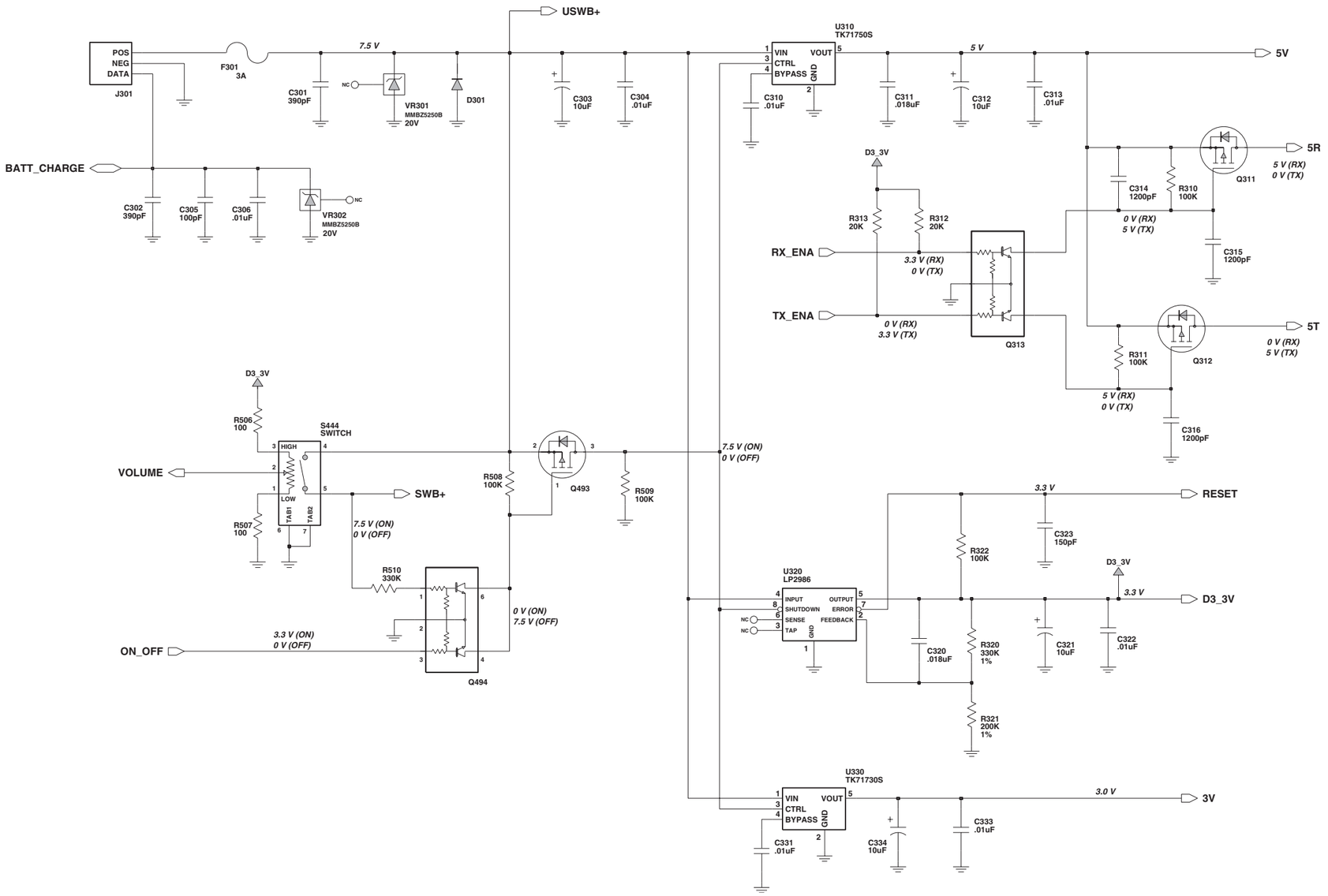


Figure 13-47. UHF (438–470 MHz) DC Regulation Schematic Diagram (8486348Z09-A)

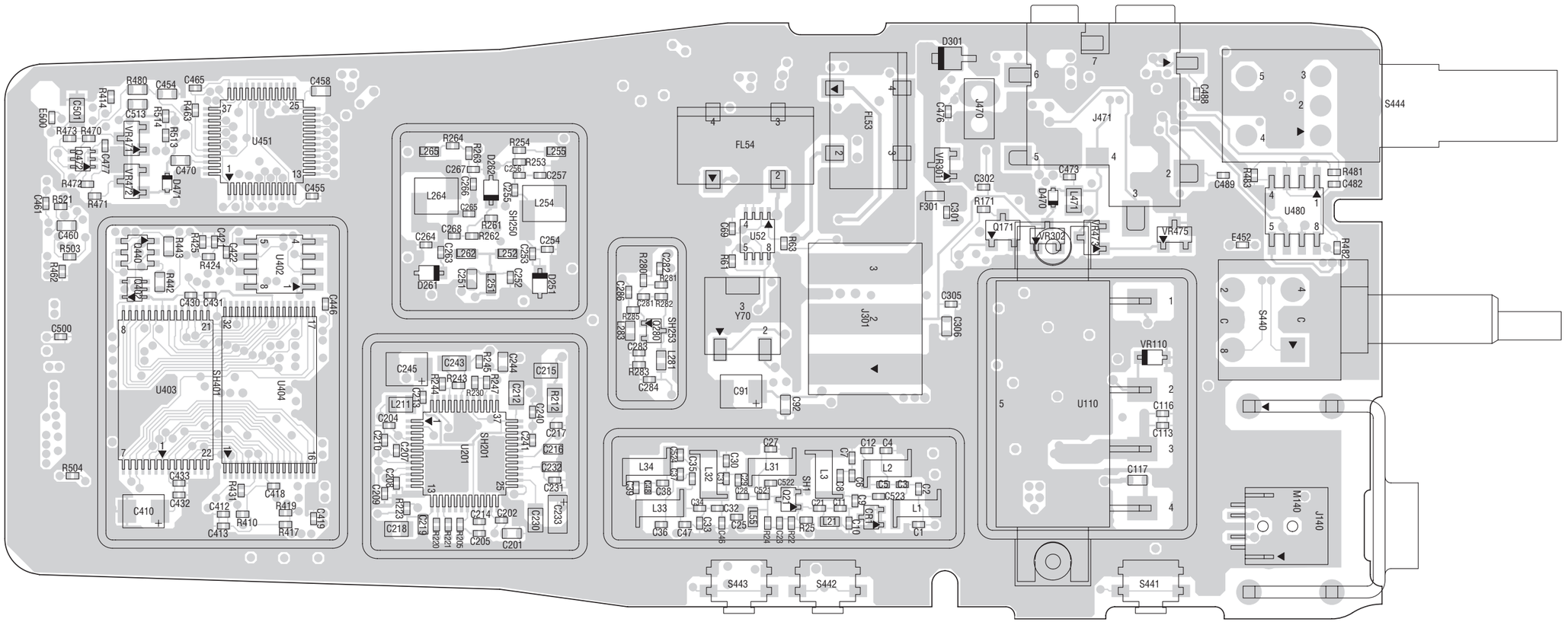


Figure 13-48. UHF (438–470 MHz) Board Component Side View (8486348Z09-A)

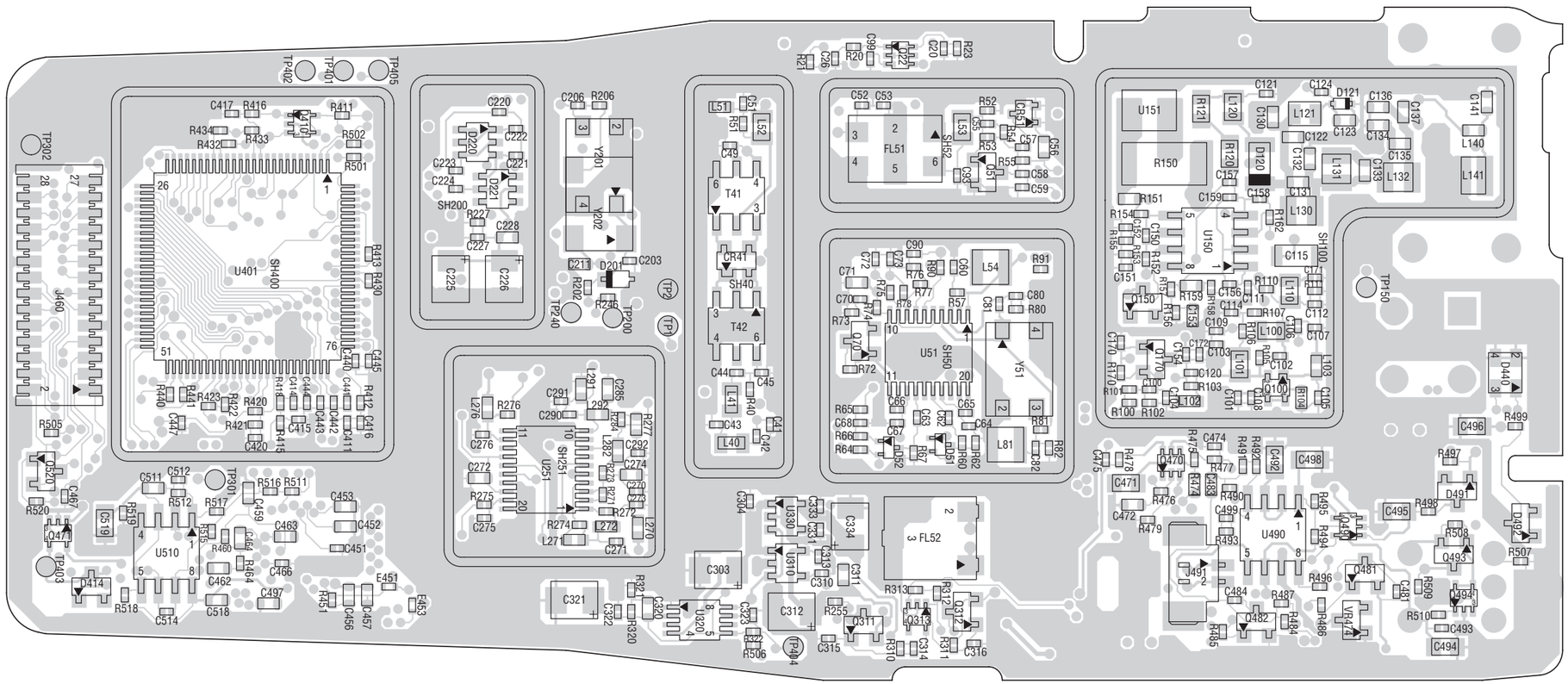


Figure 13-49. UHF (438–470 MHz) Board Solder Side View (8486348Z09-A)

UHF (438–470 MHz) Radio Parts List (8486348Z09-A)

Circuit Ref	Motorola Part No.	Description
C1	2109445U36	13 pF
C2	2109445U37	15 pF
C3	2109445U07	1.5 pF
C4	NOT PLACED	64AM DUMMY PART NUMBER
C5	0662057M01	0
C6	2109445U07	1.5 pF
C7	NOT PLACED	64AM DUMMY PART NUMBER
C8	0662057M01	0
C9	2109445U37	15 pF
C10	2109445U34	11 pF
C11	2113743N30	15 pF
C12	2109445U25	8.2 pF
C20	2113743L07	390 pF
C21	2113743L07	390 pF
C23	2113743L07	390 pF
C25	2113743L07	390 pF
C26	2113743L07	390 pF
C27	2109445U32	8 pF
C28	2109445U27	10 pF
C29	2109445U23	6.8 pF
C30	2109445U40	20 pF
C31	2109445U23	6.8 pF
C32	2109445U22	6.2 pF
C33	2109445U41	22 pF
C34	2109445U22	6.2 pF
C35	2109445U31	7 pF
C36	2109445U39	18 pF
C37	2109445U31	7 pF
C38	2109445U26	9.1 pF
C39	2109445U26	9.1 pF
C41	2113743N29	13 pF
C42	2113743N24	8.2 pF
C43	2109445U43	27 pF
C44	2113743N24	8.2 pF
C45	2113743N29	13 pF
C46	NOT PLACED	64AM DUMMY PART NUMBER
C47	NOT PLACED	64AM DUMMY PART NUMBER
C48	0662057M01	jumper
C49	NOT PLACED	64AM DUMMY PART NUMBER
C51	2113743N48	82 pF
C52	2113743N32	18 pF
C53	2109445U26	9.1 pF
C55	2113743M24	0.1 uF
C56	2113743E20	0.1 uF
C57	2113743M24	0.1 uF
C58	2113743N16	3.9 pF
C59	2113743N12	2.7 pF
C60	2113743M24	0.1 uF
C62	2113743M24	0.1 uF
C63	2113743M24	0.1 uF
C64	2113743M24	0.1 uF
C65	2113743M24	0.1 uF
C66	2113743M24	0.1 uF
C67	2113743M24	0.1 uF
C68	2113743M24	0.1 uF
C69	2113743M24	0.1 uF
C70	2113743N53	130 pF
C71	2113743E20	0.1 uF
C72	2113743M24	0.1 uF
C73	2113743L33	4700 pF
C80	2109445U44	30 pF
C81	2109445U44	30 pF
C82	NOT PLACED	64AM DUMMY PART NUMBER
C90	2113743M24	0.1 uF
C91	2311049A57	10 uF
C92	2113743E20	0.1 uF
C93	2113743N15	3.6 pF
C99	2113743M24	0.1 uF
C100	2113743L07	390 pF
C101	2113743M24	0.1 uF
C102	2113743M24	0.1 uF
C103	2113743L07	390 pF
C104	2113743N26	10 pF
C105	2113743N16	3.9 pF
C106	2113743L07	390 pF
C107	NOT PLACED	64AM DUMMY PART NUMBER
C108	2113743L07	390 pF
C109	2113743M24	0.1 uF
C111	2113743L07	390 pF
C112	2113743M24	0.1 uF
C113	2113743L07	390 pF
C114	2113743L07	390 pF
C115	2311049A07	1 uF
C116	2113743M24	0.1 uF
C117	2113740F65	390 pF
C120	NOT PLACED	64AM DUMMY PART NUMBER
C121	2113743L07	390 pF
C122	2113740F20	5.1 pF
C123	2113740F17	3.9 pF
C124	2113743L07	390 pF
C130	NOT PLACED	64AM DUMMY PART NUMBER
C131	NOT PLACED	64AM DUMMY PART NUMBER
C132	2113740F23	6.8 pF
C133	NOT PLACED	64AM DUMMY PART NUMBER
C134	2113740F23	6.8 pF
C135	NOT PLACED	64AM DUMMY PART NUMBER
C136	2113740F18	4.3 pF
C137	2113740F59	220 pF
C141	NOT PLACED	64AM DUMMY PART NUMBER
C150	2113743L07	390 pF
C151	2113743L07	390 pF
C152	2113743L07	390 pF
C153	2113743K18	0.47 uF
C154	2113743L07	390 pF
C156	2113743L41	.01 uF
C157	2113743M24	0.1 uF
C158	2113743L07	390 pF
C159	2113743L07	390 pF
C170	2113743L07	390 pF
C171	2113743L07	390 pF
C172	2113743L07	390 pF
C201	2113740F59	220 pF
C202	2109445U52	62 pF
C203	2109445U13	2.7 pF
C204	2113743L09	470 pF
C205	NOT PLACED	64AM DUMMY PART NUMBER
C206	NOT PLACED	64AM DUMMY PART NUMBER
C207	2113743L09	470 pF
C208	2113743L09	470 pF
C209	2113743L09	470 pF
C210	2113743L09	470 pF
C211	2113743E20	0.1 uF
C212	2113743F18	2.2 uF
C213	2113743L41	.01 uF
C214	2113743L17	1000 pF
C215	2113743F18	2.2 uF
C216	2113743E20	0.1 uF
C217	2113743L17	1000 pF
C218	2113743F18	2.2 uF
C219	2113743E20	0.1 uF
C220	2113743N34	22 pF
C221	2113743L41	.01 uF
C222	2113743L41	.01 uF
C223	2113743L41	.01 uF
C224	2113743L41	.01 uF
C225	2311049A57	10 uF
C226	2311049A57	10 uF
C227	2113743L17	1000 pF
C228	2113743E20	0.1 uF
C230	2113743F18	2.2 uF
C231	2113743L17	1000 pF
C232	2113743E20	0.1 uF
C233	2311049A56	4.7 uF
C240	2113743N06	1.3 pF
C241	2113743N50	100 pF
C243	2113741M69	0.1 uF
C244	2113741F49	.01 uF
C245	2311049A08	1 uF
C251	NOT PLACED	64AM DUMMY PART NUMBER
C252	2113743L07	390 pF
C253	2109445U21	5.6 pF
C254	2109445U20	5.1 pF
C255	2109445U21	5.6 pF
C256	2109445U17	3.9 pF
C257	2109445U35	12 pF
C263	2109445U18	4.3 pF
C264	2109445U10	2 pF
C265	2109445U15	3.3 pF
C266	2109445U12	2.4 pF
C267	2109445U24	7.5 pF
C268	2109445U01	0.5 pF
C270	2113743L07	390 pF
C271	2113743L07	390 pF
C272	2113743E20	0.1 uF
C273	2113743L41	.01 uF
C274	2113743E20	0.1 uF
C275	2113743L07	390 pF
C276	2113743N22	6.8 pF
C281	2113743L07	390 pF
C282	2113743N14	3.3 pF
C283	2113743L07	390 pF
C284	2113743L07	390 pF
C285	2113743E20	0.1 uF
C286	2113743N21	6.2 pF
C290	2113743N22	6.8 pF
C291	2113743N32	18 pF
C292	2113743L07	390 pF
C301	2113743L07	390 pF
C302	2113743L07	390 pF
C303	2311049A57	10 uF
C304	2113743L41	.01 uF
C305	2113743N50	100 pF
C306	2113741F49	.01 uF
C310	2113743L41	.01 uF
C311	2113743E05	.018 uF
C312	2311049A57	10 uF

Circuit Ref	Motorola Part No.	Description
C313	2113743L41	.01 uF
C314	2113743L19	1200 pF
C315	2113743L19	1200 pF
C316	2113743L19	1200 pF
C320	2113743E05	.018 uF
C321	2311049A57	10 uF
C322	2113743L41	.01 uF
C323	2113743N54	150 pF
C331	2113743L41	.01 uF
C333	2113743L41	.01 uF
C334	2311049A57	10 uF
C410	2311049A57	10 uF
C411	2113743M24	0.1 uF
C412	2113743L17	1000 pF
C413	2113743M24	0.1 uF
C414	2113743M24	0.1 uF
C415	2113743L17	1000 pF
C416	2113743L17	1000 pF
C417	2113743L17	1000 pF
C418	2113743M24	0.1 uF
C419	2113743L17	1000 pF
C420	2113743L41	.01 uF
C421	2113743L41	.01 uF
C422	2113743L41	.01 uF
C430	2113743M24	0.1 uF
C431	2113743L17	1000 pF
C432	2113743M24	0.1 uF
C433	2113743L17	1000 pF
C440	2113743L41	.01 uF
C441	2113743L41	.01 uF
C442	2113743L41	.01 uF
C443	2113743L41	.01 uF
C444	2113743L41	.01 uF
C445	2113743L41	.01 uF
C446	2113743L41	.01 uF
C447	2113743M24	0.1 uF
C451	2113743M24	0.1 uF
C452	2113743E20	0.1 uF
C453	2113743E20	0.1 uF
C454	2113743E20	0.1 uF
C455	2113743L48	.022 uF
C456	2113743E20	0.1 uF
C457	2113743E20	0.1 uF
C458	2113743E20	0.1 uF
C459	2113743E20	0.1 uF
C460	2113743E20	0.1 uF
C461	2113743L17	1000 pF
C462	2113743E20	0.1 uF
C463	2113743E20	0.1 uF
C464	2113743E20	0.1 uF
C465	2113743L17	1000 pF
C466	NOT PLACED	64AM DUMMY PART NUMBER
C467	2113743L19	1200 pF
C470	2113743E20	0.1 uF
C471	2113743F18	2.2 uF
C472	2113743E20	0.1 uF
C473	2113743N54	150 pF
C474	2113743N54	150 pF
C475	2113743L48	.022 uF
C476	2113743L48	.022 uF
C477	2113743M24	0.1 uF
C481	NOT PLACED	64AM DUMMY PART NUMBER
C482	2113743L41	.01 uF
C483	2113743E20	0.1 uF
C484	NOT PLACED	64AM DUMMY PART NUMBER
C488	2113743L09	470 pF
C489	2113743L09	470 pF
C492	2113743F18	2.2 uF
C493	2113743L17	1000 pF
C494	2113743F18	2.2 uF
C495	2113743F16	1 uF
C496	2113743F16	1 uF
C497	2113743E20	0.1 uF
C498	2113743F16	1 uF
C499	2113743N48	82 pF
C500	2113743L17	1000 pF
C501	2113743F16	1 uF
C511	2113740F59	220 pF
C512	2113743N22	6.8 pF
C513	2113740F59	220 pF
C514	2113743N31	16 pF
C518	2113743E20	0.1 uF
C519	2113743F16	1 uF
C521	2113743N20	5.6 pF
C522	2113743N01	0.5 pF
C523	PT21MTPB32	0.4 pF
C524	2186463Z01	0.2 pF
CR1	4813825A19	dual Schottky, MMBD352
CR41	4886143B01	quad ring diode, SMS3927-99
CR51	4813825A19	dual Schottky, MMBD352
D51	4802245J97	dual silicon, DAN235ETL
D52	4802245J97	dual silicon, DAN235ETL
D120	4880973Z02	silicon PIN, MA4PH261
D121	4809948D12	silicon PIN, BAR_63-02W
D201	4862824C03	varactor, 1SV232
D220	4802233J09	triple diode, IMN10
D221	4802233J09	triple diode, IMN10
D251	4862824C01	varactor, 1SV229
D261	4862824C01	varactor, 1SV229
D262	4862824C01	varactor, 1SV229
D301	4813833A19	silicon, reverse polarity, MBRM120ET3
D414	4805129M41	Schottky, MMBD501
D440	4805729G49	dual LED red/green, BRPY1204W
D470	4809924D18	Schottky, RB520S-30
D471	4809924D18	Schottky, RB520S-30
D491	4805129M41	Schottky, MMBD501
D492	4805129M41	Schottky, MMBD501
E451	2480640Z01	bead, BK1005HM471
E452	2480640Z01	bead, BK1005HM471
E453	2480640Z01	bead, BK1005HM471
E500	2480640Z01	bead, BK1005HM471
F301	6580542Z01	fuse, 3 amp
FL51	9180022M11	4-pole crystal filter, 44.85 MHz
FL52	9180468V05	4-pole ceramic filter, 455 kHz, CFU455E
FL53	9180469V05	6-pole ceramic filter, 455 kHz, CFWC455E
FL54	9180469V03	6-pole ceramic filter, 455 kHz, CFWC455G
J140	0986428Z01	connector, external antenna
J301	0986565Z01	battery contact assembly
J460	–	not used
J470	0985818A01	connector, 2-pin, internal mic
J471	0980683Z03	connector, 2.5 / 3.5 mm, accessories
J491	0909897T04	connector, 2-pin, internal spkr
L1	2409348J15	9.85 nH
L2	2409348J15	9.85 nH
L3	2409348J15	9.85 nH
L21	2413926N16	22 nH
L31	2409348J15	9.85 nH
L32	2409348J15	9.85 nH
L33	2409348J15	9.85 nH
L34	2409348J15	9.85 nH
L40	2413926K16	27 nH
L41	2413926K16	27 nH
L51	2413926N26	150 nH
L52	2413926K32	560 nH
L53	2413926K33	680 nH
L54	2413923A25	1.2 uH
L55	2413926N15	18 nH
L81		not used
L100	2413926K27	220 nH
L101	2413926K27	220 nH
L102	2409377M21	3.6 nH
L103	2409377M24	5.1 nH
L110	2413926K27	220 nH
L120	2413926K27	220 nH
L121	2462587V24	15 nH
L130	2460591C40	17.02 nH
L131	2460591C40	17.02 nH
L132	2460591C40	17.02 nH
L140	2113740F42	43 pF
L141	2479990M01	30.54 nH
L211	2413926K30	390 nH
L251	2413926N28	220 nH
L252	2413926N17	27 nH
L254	2484562T11	12.5 nH
L255	2413926N28	220 nH
L262	2413926N17	27 nH
L264	2484562T11	12.5 nH
L265	2413926N28	220 nH
L270	2413926N28	220 nH
L271		not used
L272	2413926N28	220 nH
L276	2413926N17	27 nH
L281	2413926N17	27 nH
L282	2413926N14	15 nH
L283		not used
L291	2413926N10	6.8 nH
L292	2413926N14	15 nH
L471	2413926K30	390 nH
M140	0286427Z01	antenna nut
Q21	4802247J01	silicon NPN, BFS505
Q22	4805723X02	dual silicon PNP, UMT1
Q51	4802197J95	silicon NPN, PBR941
Q70	4880214G02	silicon NPN, MMBT3904
Q100	4885593U03	silicon NPN, BFG540W
Q150	4880214G02	silicon NPN, MMBT3904
Q170	4809579E18	P-channel MOSFET, TP0101T
Q171	4880048M01	digital NPN, DTC144EKA
Q280	4802245J95	silicon NPN, BFS540
Q311	4809579E18	P-channel MOSFET, TP0101T
Q312	4809579E18	P-channel MOSFET, TP0101T
Q313	4802245J54	dual digital NPN, UMG5
Q402	4809939C05	dual digital NPN/PNP, UMC5NTL
Q410	4802245J54	dual digital NPN, UMG5
Q440	5180159R01	dual NPN, IMX1
Q470	4805723X02	dual silicon PNP, UMT1
Q471	4802245J54	dual digital NPN, UMG5
Q472	4805723X02	dual silicon PNP, UMT1
Q481		not used
Q482	4813824A10	silicon NPN, MMBT3904
Q490	4802245J54	dual digital NPN, UMG5
Q493	4809579E18	P-channel MOSFET, TP0101T
Q494	4802245J54	dual digital NPN, UMG5
Q520	4813824A10	silicon NPN, MMBT3904
R20	0662057M92	5.6K

Circuit Ref	Motorola Part No.	Description
R21	0662057M50	100
R22	0662057M92	5.6K
R23	0662057N09	27K
R24	0662057M78	1.5K
R25	0662057M92	5.6K
R40	0662057M74	1K
R51	0662057M43	51
R52	0662057N01	12K
R53	0662057N11	33K
R54	0662057M90	4.7K
R55	0662057M62	330
R57	0662057M90	4.7K
R60	0662057M83	2.4K
R61	0662057N23	100K
R62	0662057M86	3.3K
R63	0662057N13	39K
R64	0662057N06	20K
R65	0662057N13	39K
R66	0662057N06	20K
R67	0662057N06	20K
R72	0662057M64	390
R73	0662057M80	1.8K
R74	0662057M76	1.2K
R75	0662057N01	12K
R76	0662057V04	12K
R77	0662057U99	8.2K
R78	0662057M70	680
R80	0662057N03	15K
R81	NOT PLACED	64AM DUMMY PART NUMBER
R82	0662057M01	0
R90	0662057M43	51
R91	0662057M79	1.6K
R100	0662057M72	820
R101	0662057M20	5.6
R102	0662057M72	820
R103	0662057M85	3K
R104	0662057A07	18
R105	0662057M84	2.7K
R106	0662057M90	4.7K
R107	NOT PLACED	64AM DUMMY PART NUMBER
R110	0662057M70	680
R111	0662057M77	1.3K
R120	0662057C55	150
R121	0662057C55	150
R150	0680539Z01	0.1
R151	0662057A15	39
R152	0662057V27	100K
R153	0662057V27	100K
R154	0662057V27	100K
R155	0662057V27	100K
R156	0662057M62	330
R157	0662057M82	2.2K
R158	0662057M91	5.1K
R159	0662057B47	0
R162	0662057M98	10K
R170	0662057N23	100K
R171	0662057N07	22K
R202	0662057N27	150K
R205	0662057M50	100
R206	NOT PLACED	64AM DUMMY PART NUMBER
R212	0662057C01	0
R220	0662057M54	150
R221	0662057M54	150
R223	0662057M50	100
R227	0662057N27	150K
R230	0662057N23	100K
R243	0662057M81	2K
R244	0662057M43	51
R245	0662057M78	1.5K
R246	0662057N23	100K
R247	0662057N22	91K
R253	0662057M38	33
R254	0662057M50	100
R255	0662057U91	3.9K
R261	0662057N07	22K
R262	0662057M94	6.8K
R263	0662057M38	33
R264	0662057M50	100
R271	0662057M91	5.1K
R272	0662057M92	5.6K
R273	0662057M62	330
R274	0662057M38	33
R275	0662057M50	100
R276	0662057M74	1K
R277	0662057B47	0
R280	0662057M90	4.7K
R281	0662057M96	8.2K
R282	0662057M73	910
R283	0662057M54	150
R284	0662057M62	330
R285	0662057M01	0
R310	0662057N23	100K
R311	0662057N23	100K
R312	0662057N06	20K
R313	0662057N06	20K
R320	0662057V43	330K
R321	0662057V35	200K
R322	0662057N23	100K
R410	0662057M98	10K
R411	0662057M72	820
R412	0662057N23	100K
R413	0662057N23	100K
R414	0662057N11	33K
R415	0662057N11	33K
R416	0662057N06	20K
R417	0662057M98	10K
R418	0662057N23	100K
R419	0662057M90	4.7K
R420	0662057V35	200K
R421	0662057V27	100K
R422	0662057N23	100K
R423	0662057N23	100K
R424	0662057V35	200K
R425	0662057V27	100K
R430	0662057N23	100K
R431	NOT PLACED	64AM DUMMY PART NUMBER
R432	0662057M01	0
R433	0662057N23	100K
R434	NOT PLACED	64AM DUMMY PART NUMBER
R440	0662057M90	4.7K
R441	0662057M90	4.7K
R442	0662057A33	220
R443	0662057A27	120
R451	0662057N15	47K
R460	0662057N08	24K
R462	0662057N08	24K
R463	0662057N08	24K
R464	0662057N10	30K
R470	0662057M82	2.2K
R471	0662057M82	2.2K
R472	0662057M70	680
R473	0662057M70	680
R474	0662057A37	330
R475	0662057N29	180K
R476	0662057N23	100K
R477	0662057M82	2.2K
R478	0662057M82	2.2K
R479	0662057N23	100K
R480	0662057B47	0
R481	0662057N23	100K
R482	0662057N29	180K
R483	0662057N29	180K
R484	NOT PLACED	64AM DUMMY PART NUMBER
R485	0662057N23	100K
R486	0662057N23	100K
R487	0662057M01	0
R490	NOT PLACED	64AM DUMMY PART NUMBER
R491	0662057M01	0
R492	0662057N08	24K
R493	0662057N35	330K
R494	0662057V43	330K
R495	0662057M92	5.6K
R496	NOT PLACED	64AM DUMMY PART NUMBER
R497	0662057N47	1MEG
R498	0662057N15	47K
R499	0662057N33	270K
R501	0662057M50	100
R502	0662057M50	100
R503	0662057M50	100
R504	0662057M50	100
R505	0662057M50	100
R506	0662057M50	100
R507	0662057M50	100
R508	0662057N23	100K
R509	0662057N23	100K
R510	0662057N35	330K
R511	0662057N23	100K
R512	0662057N27	150K
R513	0662057N23	100K
R514	0662057N23	100K
R515	0662057M01	0
R516	NOT PLACED	64AM DUMMY PART NUMBER
R517	NOT PLACED	64AM DUMMY PART NUMBER
R518	0662057N31	220K
R519	0662057N23	100K
R520	0662057N23	100K
R521	0662057N23	100K
S440	4080710Z22	switch, rotary, 16 channel select
	or 4080710Z13	switch, rotary, 4 channel select
S441	4070354A01	pushbutton switch, PTT
S442	4070354A01	pushbutton switch, side option (lower)
S443	4070354A01	pushbutton switch, side option (upper)
S444	1880619Z02	switch, rotary on-off, with 10K volume control
SH1	2686421Z01	shield, comp side, RF front end
SH40	2686419Z01	shield, solder side, first mixer
SH50	2686423Z01	shield, solder side, IFIC and 2nd LO crystal

Circuit Ref	Motorola Part No.	Description
SH52	2686424Z01	shield, solder side, high IF crystal filter
SH100	2686418Z01	shield, solder side, transmitter
SH200	2686424Z01	shield, solder side, synthesizer charge pump
SH201	2686423Z01	shield, com side, synthesizer
SH250	2686425Z01	shield, comp side, VCO tank circuits
SH251	2686425Z01	shield, solder side, VCOBIC
SH253	2686422Z01	shield, comp side, VCO RX injection buffer
SH400	2686420Z01	shield, solder side, microprocessor
SH401	2686420Z01	shield, comp side, memory
T41	2580541Z02	transformer, balun
T42	2580541Z02	transformer, balun
U51	5186144B01	receiver system (IFIC), SA616
U52	5109522E10	triple inverter, TC7W04F
U110	5102466J01	transmitter PA module, RA07M4452M_UHF
U150	5113818A01	dual opamp, LM2904
U151	2484657R01	bead
U201*	5185963A27	frequency synthesizer
U251	5105750U54	VCO/buffer
U310	5102478J01	5V voltage regulator, TK71750S
U320	5185963A55	adjustable voltage regulator w/ reset, LP2986
U330	5102479J01	3V voltage regulator, TK71730S
U401*	5102226J56	microprocessor, MC68HC11FL0
U402*	5102463J64	serial EEPROM 16Kx8, AT25128
U403		not used
U404*	5102480J01	Flash ROM 128Kx8, AT49LV001N_70V
U451	5185130C53	audio filter (ASFIC_cmp)
U480	5113818A01	dual opamp, LM2904
U490	5108858K99	audio power amplifier, TDA8541
U510	5113818A01	dual opamp, LM2904
VR110		not used
VR301	4813830A33	zener diode, 20V, MMBZ5250B
VR302	4813830A33	zener diode, 20V, MMBZ5250B
VR471	4813830A18	zener diode, 6.8V, MMBZ5235B
VR472	4813830A09	zener diode, 3.3V, MMBZ5226B
VR473	4813830A33	zener diode, 20V, MMBZ5250B
VR474	4813830A33	zener diode, 20V, MMBZ5250B
VR475	4880140L20	zener diode, 15V, MMBZ5245B
Y51	4880606B09	crystal, 44.395 MHz
Y70	9186145B02	ceramic discriminator, 455 kHz
Y201*	4880114R06	crystal, 16.8 MHz
Y202		not used

* Motorola Depot Servicing only

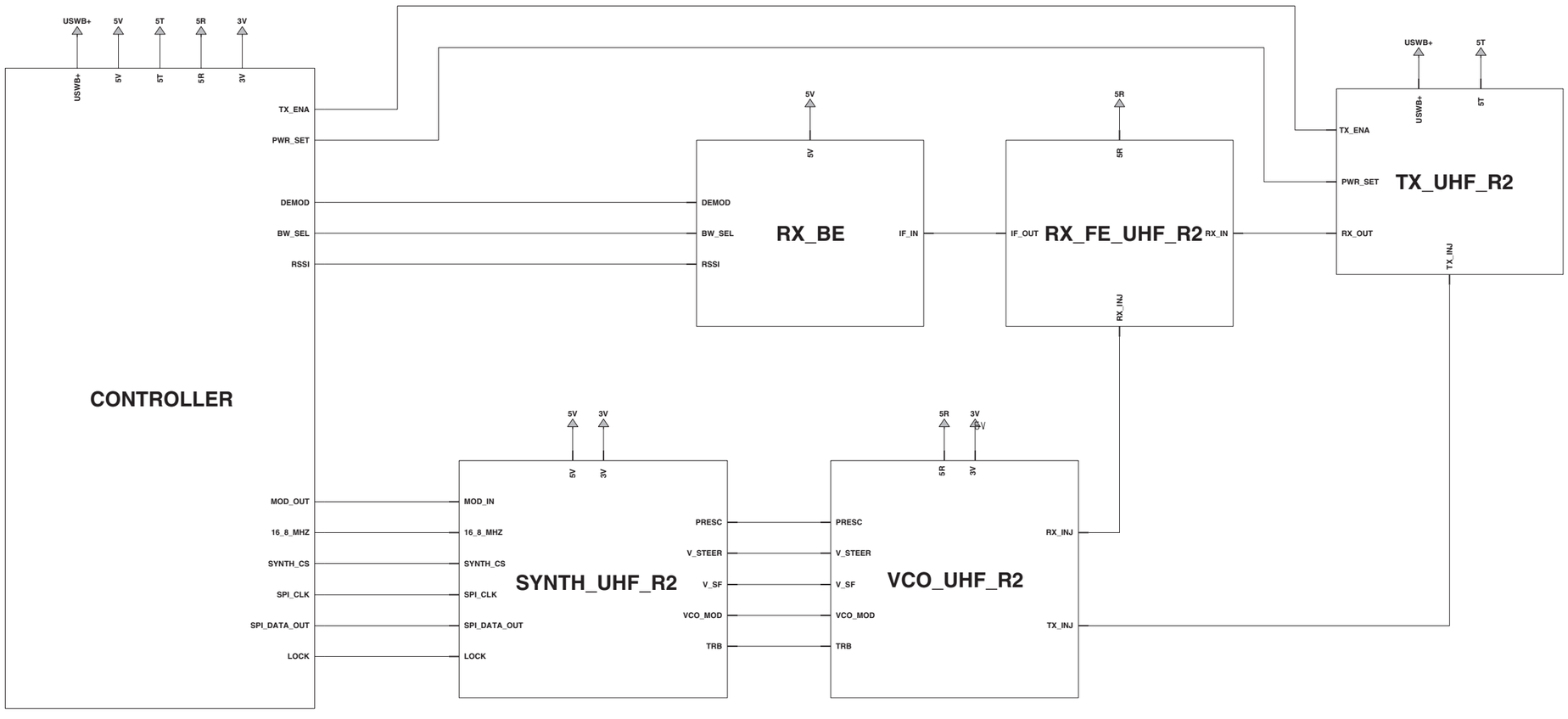


Figure 13-50. UHF (438–470 MHz) Radio Circuit Block Diagram (8486348Z13-C)

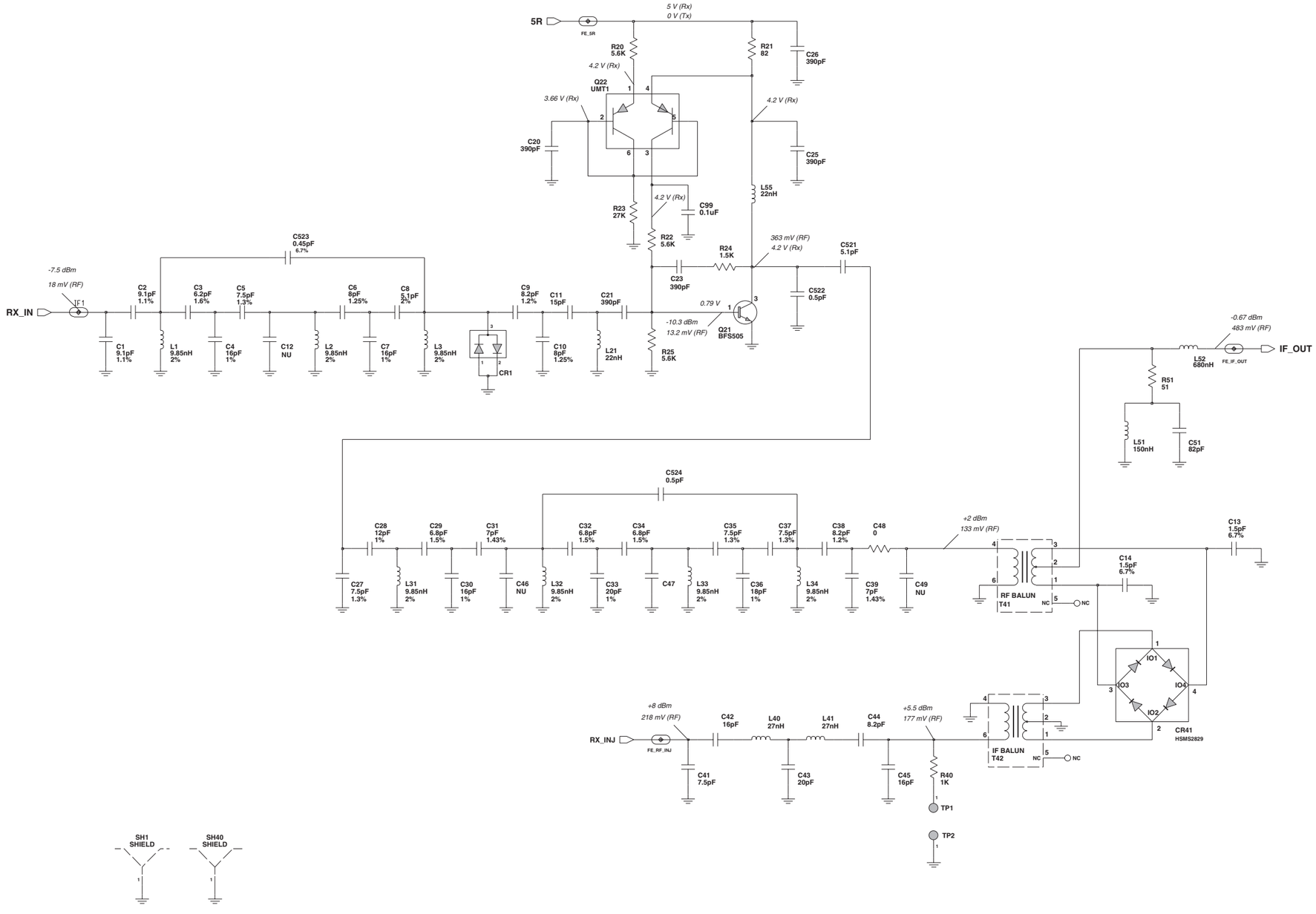


Figure 13-51. UHF (438–470 MHz) Receiver Front End Schematic Diagram (8486348Z13-C)

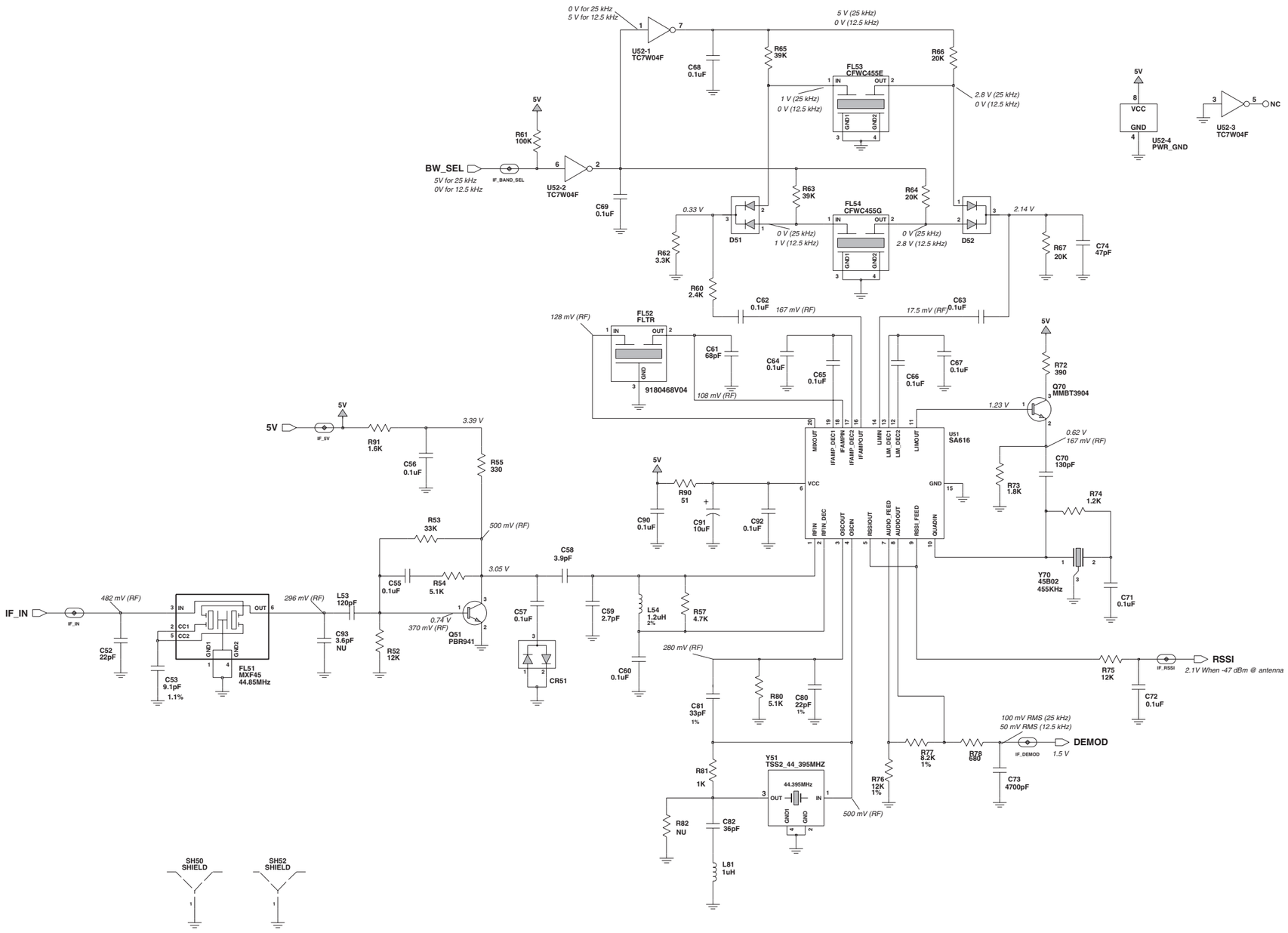
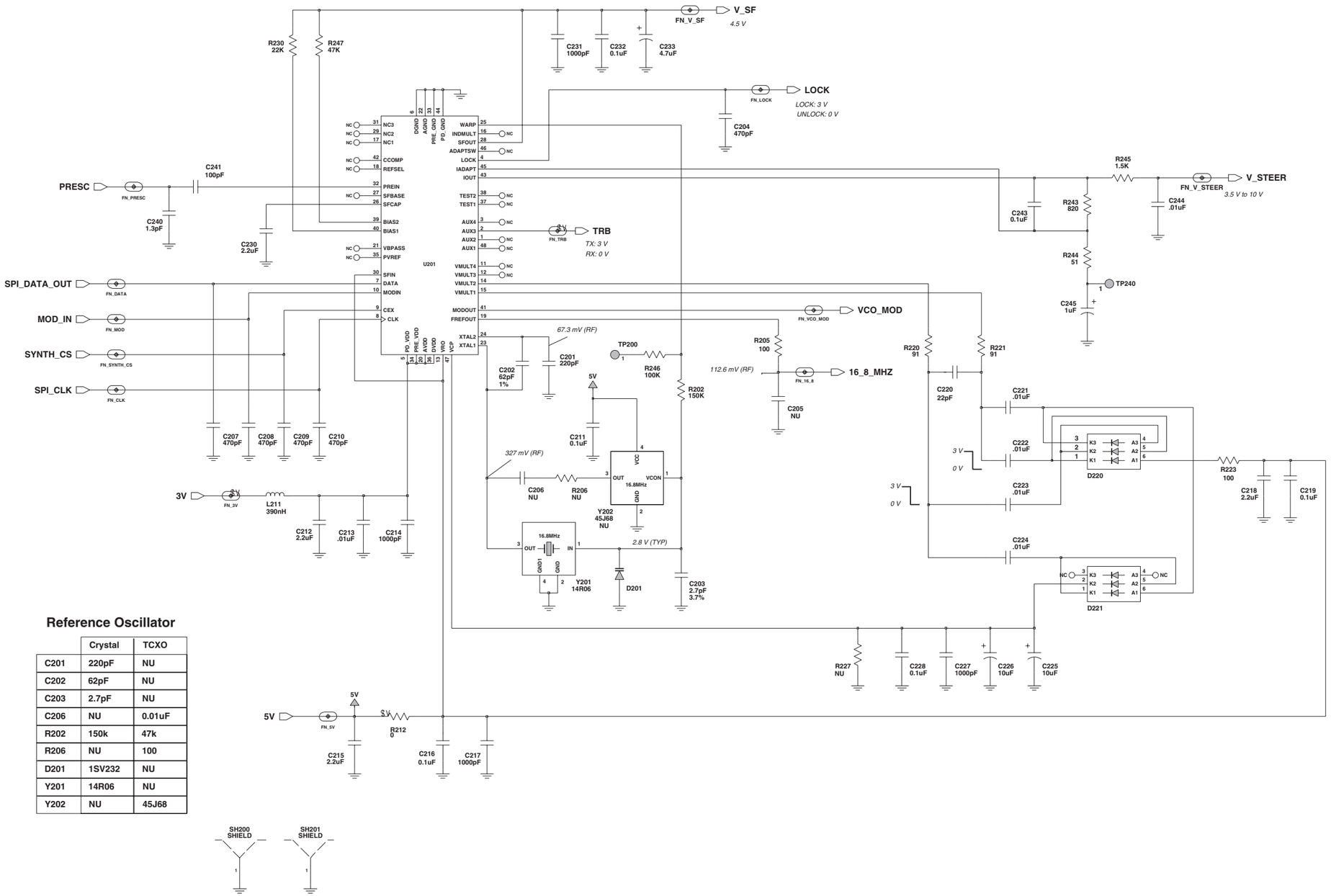


Figure 13-52. UHF (438–470 MHz) Receiver Back End Schematic Diagram (8486348Z13-C)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 13-53. UHF (438–470 MHz) Synthesizer Schematic Diagram (8486348Z13-C)

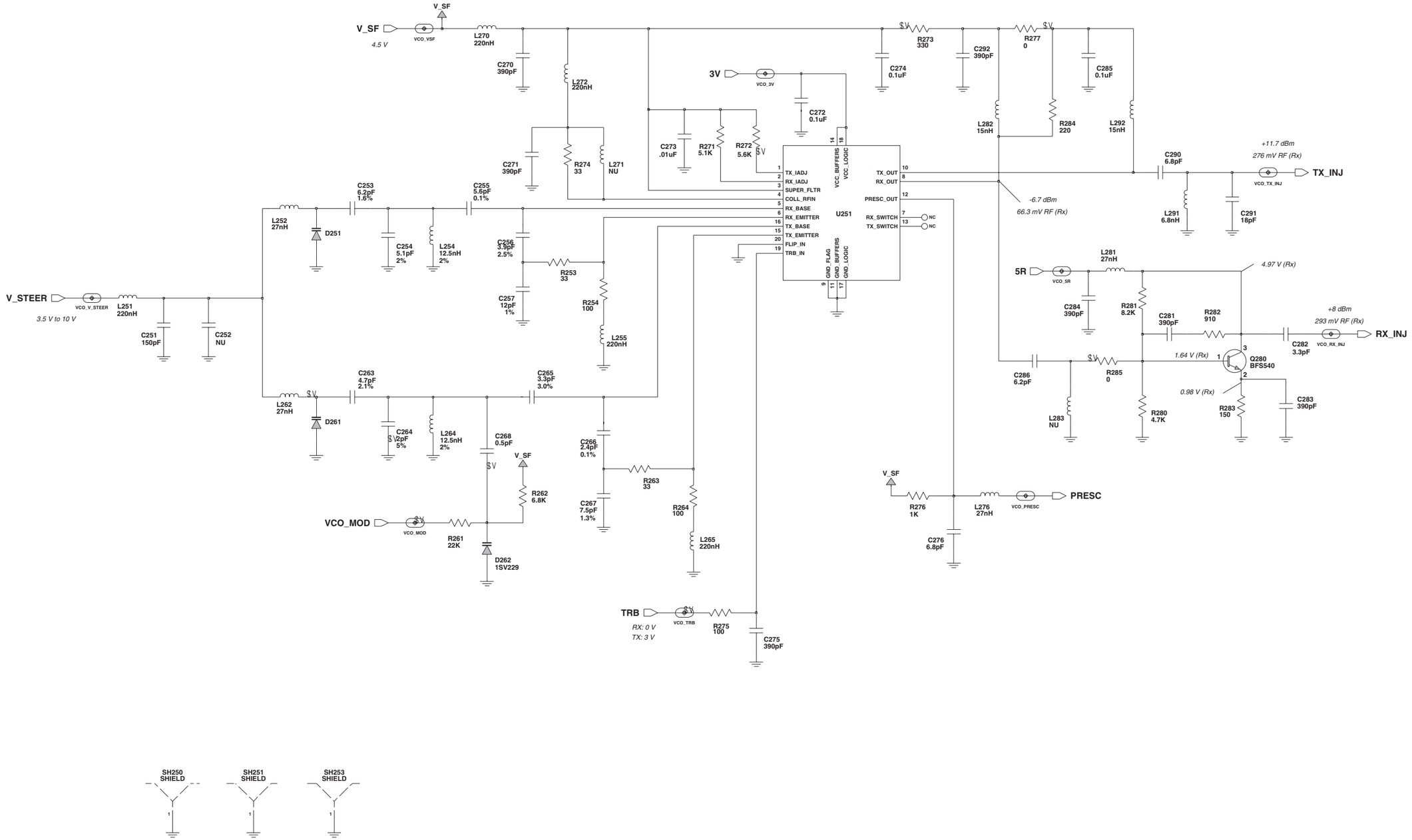


Figure 13-54. UHF (438–470 MHz) Voltage Controlled Oscillator Schematic Diagram (8486348Z13-C)

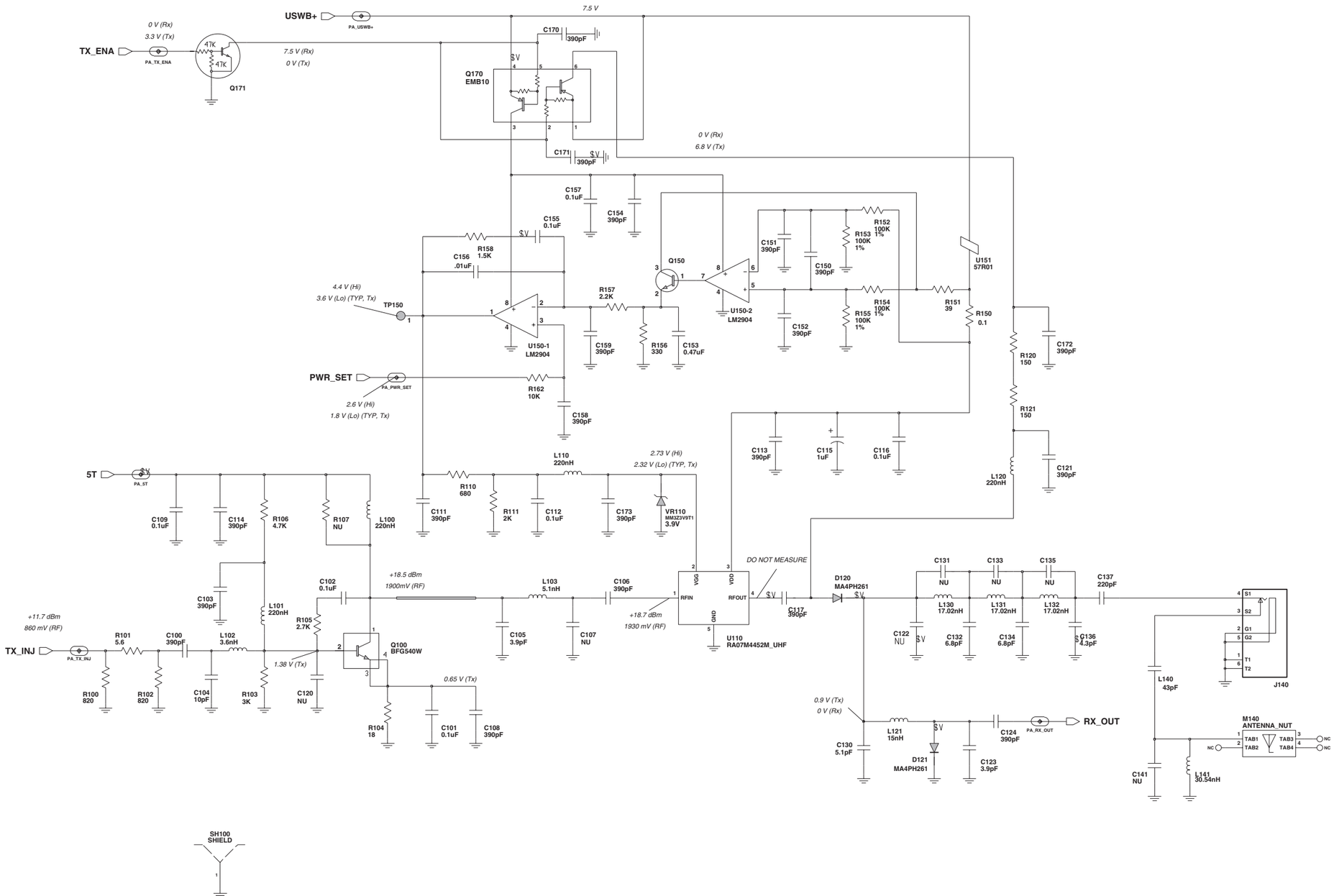


Figure 13-55. UHF (438–470 MHz) Transmitter and Power Control Schematic Diagram (8486348Z13-C)

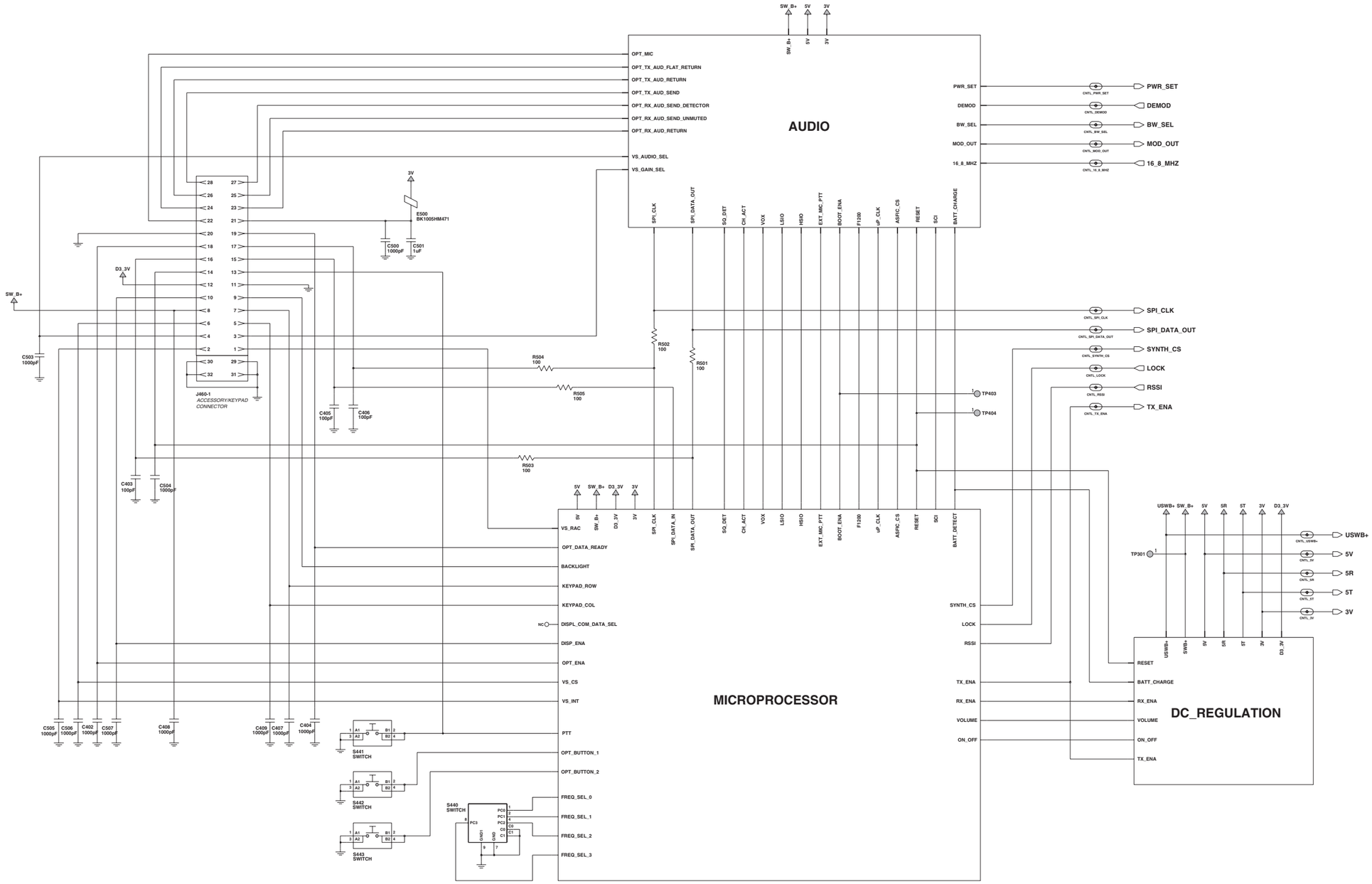


Figure 13-56. UHF (438–470 MHz) Controller Interconnect Schematic Diagram (8486348Z13-C)

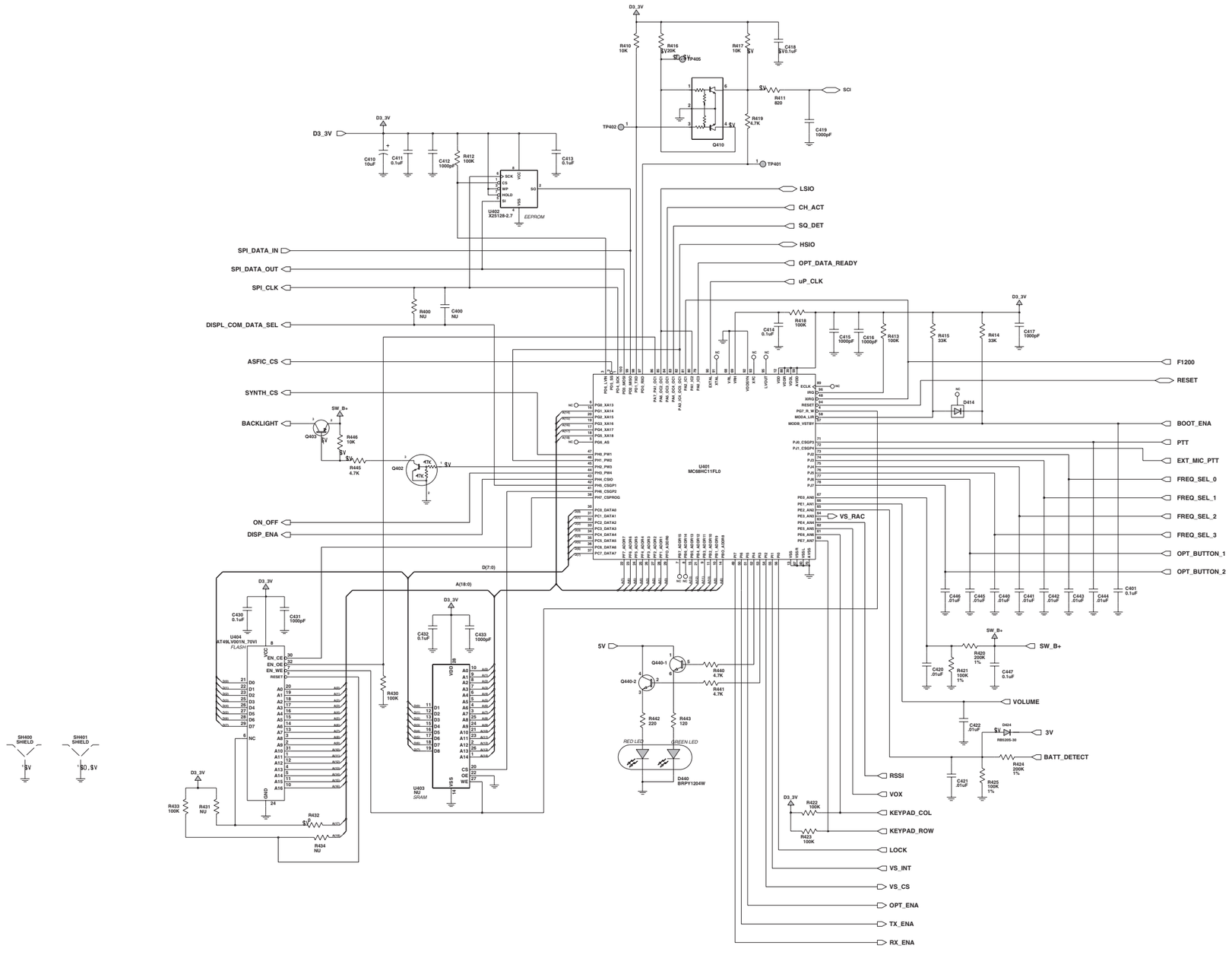


Figure 13-57. UHF (438–470 MHz) Microprocessor Circuitry Schematic Diagram (8486348Z13-C)

	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

Figure 13-58. UHF (438–470 MHz) Audio Circuitry Schematic Diagram (8486348Z13-C)

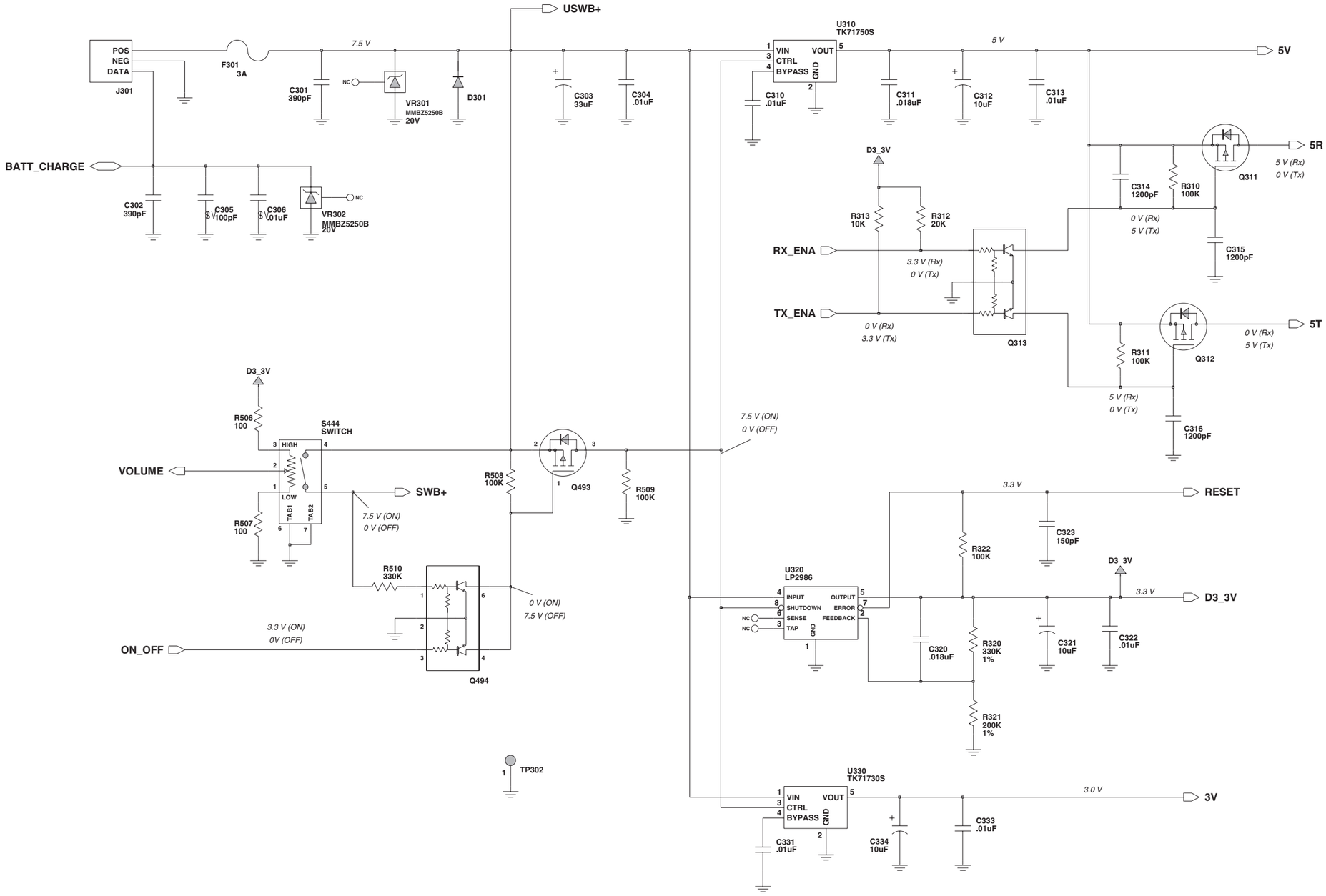
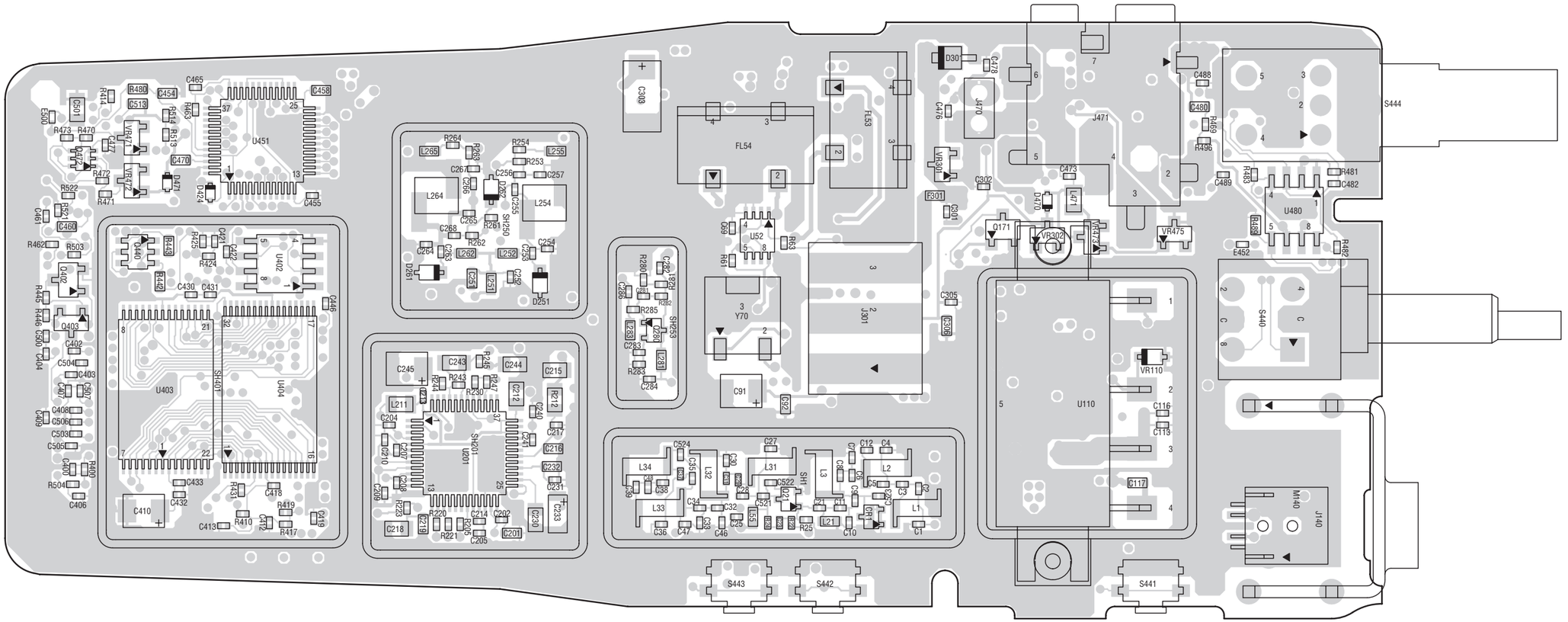


Figure 13-59. UHF (438–470 MHz) DC Regulation Schematic Diagram (8486348Z13-C)


U451
U402
U403
U404
U440
U480
U110
U52
U201
SH401
SH201
SH253
SH250
FL54
FL53
Y70
J301
J470
J471
J140
S444
S440
S441
S442
S443
VR302
VR475
VR110
Q171
D30
D470
D471
D424
D251
D281
D282
L264
L254
L269
L262
L252
L251
L255
L211
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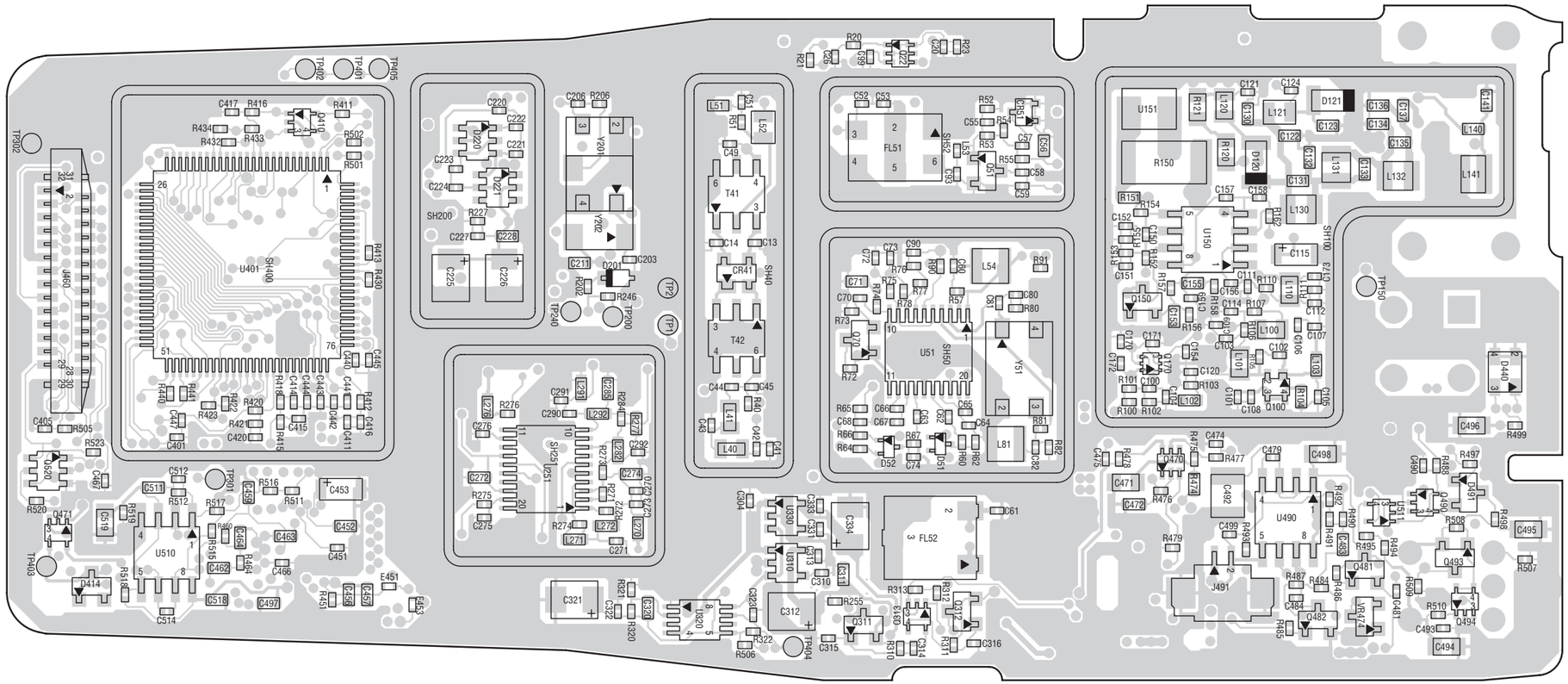


Figure 13-61. UHF (438–470 MHz) Board Solder Side View (8486348Z13-C)

UHF (438–470 MHz) Radio Parts List (8486348Z13-C)

Circuit Ref	Motorola Part No.	Description
C1	2109445U26	CAP, 9.1pF
C2	2109445U26	CAP, 9.1pF
C3	2109445U22	CAP, 6.2pF
C4	2109445U38	CAP, 16pF
C5	2109445U24	CAP, 7.5pF
C6	2109445U32	CAP, 8pF
C7	2109445U38	CAP, 16pF
C8	2109445U20	CAP, 5.1pF
C9	2109445U25	CAP, 8.2pF
C10	2109445U32	CAP, 8pF
C11	2113743N30	CAP, 15pF
C12	NOT PLACED	CAP, 8.2pF
C13	2109445U07	CAP, 1.5pF
C14	2109445U07	CAP, 1.5pF
C20	2113743L07	CAP, 390pF
C21	2113743L07	CAP, 390pF
C23	2113743L07	CAP, 390pF
C25	2113743L07	CAP, 390pF
C26	2113743L07	CAP, 390pF
C27	2109445U24	CAP, 7.5pF
C28	2109445U35	CAP, 12pF
C29	2109445U23	CAP, 6.8pF
C30	2109445U38	CAP, 16pF
C31	2109445U31	CAP, 7pF
C32	2109445U23	CAP, 6.8pF
C33	2109445U40	CAP, 20pF
C34	2109445U23	CAP, 6.8pF
C35	2109445U24	CAP, 7.5pF
C36	2109445U39	CAP, 18pF
C37	2109445U24	CAP, 7.5pF
C38	2109445U25	CAP, 8.2pF
C39	2109445U31	CAP, 7pF
C41	2113743N23	CAP, 7.5pF
C42	2113743N31	CAP, 16pF
C43	2113743N33	CAP, 20pF
C44	2113743N24	CAP, 8.2pF
C45	2113743N31	CAP, 16pF
C46	NOT PLACED	CAP, 10pF
C47	NOT PLACED	CAP, 10pF
C48	0662057M01	RES, 0
C49	NOT PLACED	CAP, 3.9pF
C51	2113743N48	CAP, 82pF
C52	2109445U41	CAP, 22pF
C53	2109445U26	CAP, 9.1pF
C55	2113743M24	CAP, 0.1uF
C56	2113743E20	CAP, 0.1uF
C57	2113743M24	CAP, 0.1uF
C58	2113743N16	CAP, 3.9pF
C59	2113743N12	CAP, 2.7pF
C60	2113743M24	CAP, 0.1uF
C61	2113743N46	CAP, 68pF
C62	2113743M24	CAP, 0.1uF
C63	2113743M24	CAP, 0.1uF
C64	2113743M24	CAP, 0.1uF
C65	2113743M24	CAP, 0.1uF
C66	2113743M24	CAP, 0.1uF
C67	2113743M24	CAP, 0.1uF
C68	2113743M24	CAP, 0.1uF
C69	2113743M24	CAP, 0.1uF
C70	2113743N53	CAP, 130pF
C71	2113743E20	CAP, 0.1uF
C72	2113743M24	CAP, 0.1uF
C73	2113743L33	CAP, 4700pF
C74	2113743N42	CAP, 47pF
C80	2109445U41	CAP, 22pF
C81	2109445U45	CAP, 33pF
C82	2109445U46	CAP, 36pF
C90	2113743M24	CAP, 0.1uF
C91	2311049A57	CAPP, 10uF
C92	2113743E20	CAP, 0.1uF
C93	NOT PLACED	CAP, 3.6pF
C99	2113743M24	CAP, 0.1uF
C100	2113743L07	CAP, 390pF
C101	2113743M24	CAP, 0.1uF
C102	2113743M24	CAP, 0.1uF
C103	2113743L07	CAP, 390pF
C104	2113743N26	CAP, 10pF
C105	2113743N16	CAP, 3.9pF
C106	2113743L07	CAP, 390pF
C107	NOT PLACED	CAP, 27pF
C108	2113743L07	CAP, 390pF
C109	2113743M24	CAP, 0.1uF
C111	2113743L07	CAP, 390pF
C112	2113743M24	CAP, 0.1uF
C113	2113743L07	CAP, 390pF
C114	2113743L07	CAP, 390pF
C115	2311049A07	CAPP, 1uF
C116	2113743M24	CAP, 0.1uF
C117	2113740F65	CAP, 390pF
C120	NOT PLACED	CAP, 8.2pF
C121	2113743L07	CAP, 390pF
C122	NOT PLACED	CAP, 5.1pF
C123	2113740F17	CAP, 3.9pF
C124	2113743L07	CAP, 390pF
C130	2113740F20	CAP, 5.1pF
C131	NOT PLACED	CAP, 2.2pF
C132	2113740F23	CAP, 6.8pF
C133	NOT PLACED	CAP, 2.7pF
C134	2113740F23	CAP, 6.8pF
C135	NOT PLACED	CAP, 0.5pF
C136	2113740F18	CAP, 4.3pF
C137	2113740F59	CAP, 220pF
C141	NOT PLACED	CAP, 8.2pF
C150	2113743L07	CAP, 390pF
C151	2113743L07	CAP, 390pF
C152	2113743L07	CAP, 390pF
C153	2113743K18	CAP, 0.47uF
C154	2113743L07	CAP, 390pF
C155	2113743E20	CAP, 0.1uF
C156	2113743L41	CAP, .01uF
C157	2113743M24	CAP, 0.1uF
C158	2113743L07	CAP, 390pF
C159	2113743L07	CAP, 390pF
C170	2113743L07	CAP, 390pF
C171	2113743L07	CAP, 390pF
C172	2113743L07	CAP, 390pF
C173	2113743L07	CAP, 390pF
C201	2113740F59	CAP, 220pF
C202	2109445U52	CAP, 62pF
C203	2109445U13	CAP, 2.7pF
C204	2113743L09	CAP, 470pF
C205	NOT PLACED	CAP, 2.7pF
C206	NOT PLACED	CAP, 1000pF
C207	2113743L09	CAP, 470pF
C208	2113743L09	CAP, 470pF
C209	2113743L09	CAP, 470pF
C210	2113743L09	CAP, 470pF
C211	2113743E20	CAP, 0.1uF
C212	2113743F18	CAP, 2.2uF
C213	2113743L41	CAP, .01uF
C214	2113743L17	CAP, 1000pF
C215	2113743F18	CAP, 2.2uF
C216	2113743E20	CAP, 0.1uF
C217	2113743L17	CAP, 1000pF
C218	2113743F18	CAP, 2.2uF
C219	2113743E20	CAP, 0.1uF
C220	2113743N34	CAP, 22pF
C221	2113743L41	CAP, .01uF
C222	2113743L41	CAP, .01uF
C223	2113743L41	CAP, .01uF
C224	2113743L41	CAP, .01uF
C225	2311049A57	CAPP, 10uF
C226	2311049A57	CAPP, 10uF
C227	2113743L17	CAP, 1000pF
C228	2113743E20	CAP, 0.1uF
C230	2113743F18	CAP, 2.2uF
C231	2113743L17	CAP, 1000pF
C232	2113743E20	CAP, 0.1uF
C233	2311049A56	CAPP, 4.7uF
C240	2113743N06	CAP, 1.3pF
C241	2113743N50	CAP, 100pF
C243	0886641Z01	CAP, 0.1uF
C244	0888600M25	CAP, .01uF
C245	2311049A08	CAPP, 1uF
C251	0888600M03	CAP, 150pF
C252	NOT PLACED	CAP, 390pF
C253	2109445U22	CAP, 6.2pF
C254	2109445U20	CAP, 5.1pF
C255	2109445U21	CAP, 5.6pF
C256	2109445U17	CAP, 3.9pF
C257	2109445U35	CAP, 12pF
C263	2109445U19	CAP, 4.7pF
C264	2109445U10	CAP, 2pF
C265	2109445U15	CAP, 3.3pF
C266	2109445U12	CAP, 2.4pF
C267	2109445U24	CAP, 7.5pF
C268	2109445U01	CAP, 0.5pF
C270	2113743L07	CAP, 390pF
C271	2113743L07	CAP, 390pF
C272	2113743E20	CAP, 0.1uF
C273	2113743L41	CAP, .01uF
C274	2113743E20	CAP, 0.1uF
C275	2113743L07	CAP, 390pF
C276	2113743N22	CAP, 6.8pF
C281	2113743L07	CAP, 390pF
C282	2113743N14	CAP, 3.3pF
C283	2113743L07	CAP, 390pF
C284	2113743L07	CAP, 390pF
C285	2113743E20	CAP, 0.1uF
C286	2113743N21	CAP, 6.2pF
C290	2113743N22	CAP, 6.8pF
C291	2113743N32	CAP, 18pF
C292	2113743L07	CAP, 390pF
C301	2113743L07	CAP, 390pF
C302	2113743L07	CAP, 390pF
C303	2311049A97	CAPP, 33uF
C304	2113743L41	CAP, .01uF
C305	2113743N50	CAP, 100pF
C306	2113741F49	CAP, .01uF
C310	2113743L41	CAP, .01uF
C311	2113743E05	CAP, .018uF
C312	2311049A57	CAPP, 10uF
C313	2113743L41	CAP, .01uF
C314	2113743L19	CAP, 1200pF
C315	2113743L19	CAP, 1200pF
C316	2113743L19	CAP, 1200pF
C320	2113743E05	CAP, .018uF
C321	2311049A57	CAPP, 10uF
C322	2113743L41	CAP, .01uF
C323	2113743N54	CAP, 150pF
C331	2113743L41	CAP, .01uF
C333	2113743L41	CAP, .01uF
C334	2311049A57	CAPP, 10uF

Circuit Ref	Motorola Part No.	Description
C400	NOT PLACED	CAP, .022uF
C401	2113743M24	CAP, 0.1uF
C402	2113743L17	CAP, 1000pF
C403	2113743N50	CAP, 100pF
C404	2113743L17	CAP, 1000pF
C405	2113743N50	CAP, 100pF
C406	2113743N50	CAP, 100pF
C407	2113743L17	CAP, 1000pF
C408	2113743L17	CAP, 1000pF
C409	2113743L17	CAP, 1000pF
C410	2311049A57	CAPP, 10uF
C411	2113743M24	CAP, 0.1uF
C412	2113743L17	CAP, 1000pF
C413	2113743M24	CAP, 0.1uF
C414	2113743M24	CAP, 0.1uF
C415	2113743L17	CAP, 1000pF
C416	2113743L17	CAP, 1000pF
C417	2113743L17	CAP, 1000pF
C418	2113743M24	CAP, 0.1uF
C419	2113743L17	CAP, 1000pF
C420	2113743L41	CAP, .01uF
C421	2113743L41	CAP, .01uF
C422	2113743L41	CAP, .01uF
C430	2113743M24	CAP, 0.1uF
C431	2113743L17	CAP, 1000pF
C432	2113743M24	CAP, 0.1uF
C433	2113743L17	CAP, 1000pF
C440	2113743L41	CAP, .01uF
C441	2113743L41	CAP, .01uF
C442	2113743L41	CAP, .01uF
C443	2113743L41	CAP, .01uF
C444	2113743L41	CAP, .01uF
C445	2113743L41	CAP, .01uF
C446	2113743L41	CAP, .01uF
C447	2113743M24	CAP, 0.1uF
C451	2113743M24	CAP, 0.1uF
C452	2113743E20	CAP, 0.1uF
C453	2311049A56	CAPP, 4.7uF
C454	2113743E20	CAP, 0.1uF
C455	2113743L48	CAP, .022uF
C456	2113743E20	CAP, 0.1uF
C457	2113743E20	CAP, 0.1uF
C458	2113743E20	CAP, 0.1uF
C459	2113743E20	CAP, 0.1uF
C460	2113743E20	CAP, 0.1uF
C461	2113743L17	CAP, 1000pF
C462	2113743E20	CAP, 0.1uF
C463	2113743E20	CAP, 0.1uF
C464	2113743E20	CAP, 0.1uF
C465	2113743L17	CAP, 1000pF
C466	NOT PLACED	CAP, 470pF
C467	2113743L19	CAP, 1200pF
C470	2113743E20	CAP, 0.1uF
C471	2113743F18	CAP, 2.2uF
C472	2113743E20	CAP, 0.1uF
C473	2113743N54	CAP, 150pF
C474	2113743N54	CAP, 150pF
C475	2113743L48	CAP, .022uF
C476	2113743L48	CAP, .022uF
C477	2113743M24	CAP, 0.1uF
C478	2113743N54	CAP, 150pF
C479	2113743N54	CAP, 150pF
C480	2113743E20	CAP, 0.1uF
C481	NOT PLACED	CAP, .01uF
C482	NOT PLACED	CAP, .01uF
C483	2113928H02	CAP, 0.22uF
C484	NOT PLACED	CAP, .033uF
C488	2113743L09	CAP, 470pF
C489	2113743L09	CAP, 470pF
C490	2113743L09	CAP, 470pF
C492	2113928J08	CAP, 10uF
C493	2113743L17	CAP, 1000pF
C494	2113743F18	CAP, 2.2uF
C495	2113743F16	CAP, 1uF
C496	2113743F16	CAP, 1uF
C497	2113743E20	CAP, 0.1uF
C498	2113743F16	CAP, 1uF
C499	2113743N40	CAP, 39pF
C500	2113743L17	CAP, 1000pF
C501	2113743F16	CAP, 1uF
C503	2113743L17	CAP, 1000pF
C504	2113743L17	CAP, 1000pF
C505	2113743L17	CAP, 1000pF
C506	2113743L17	CAP, 1000pF
C507	2113743L17	CAP, 1000pF
C511	2113740F59	CAP, 220pF
C512	2113743N22	CAP, 6.8pF
C513	2113740F59	CAP, 220pF
C514	2113743N31	CAP, 16pF
C518	2113743E20	CAP, 0.1uF
C519	2113743F16	CAP, 1uF
C521	2109445U20	CAP, 5.1pF
C522	2109445U01	CAP, 0.5pF
C523	2186463Z02	CAP, 0.45pF
C524	2186463Z03	CAP, 0.5pF
CR1	4813825A19	dual Schottky, MMBD352
CR41	4802246J04	quad ring diode, HSMS2829
CR51	4813825A19	dual Schottky, MMBD352
D51	4802245J97	dual silicon, DAN235ETL
D52	4802245J97	dual silicon, DAN235ETL
D120	4880973Z02	silicon, PIN, MA4PH261
D121	4880973Z02	silicon PIN, MA4PH261
D201	4862824C03	varactor, 1SV232
D220	4802233J09	triple diode, IMN10
D221	4802233J09	triple diode, IMN10
D251	4862824C01	varactor, 1SV229
D261	4862824C01	varactor, 1SV229
D262	4862824C01	varactor, 1SV229
D301	4813833A19	silicon, reverse polarity, MBRM120ET3
D414	4805129M41	Schottky, MMBD501
D424	4809924D18	Schottky, RB520S-30
D440	4805729G49	dual LED red/green, BRPY1204W
D470	4809924D18	Schottky, RB520S-30
D471	4809924D18	Schottky, RB520S-30
D491	NOT PLACED	MMBD501
E451	2480640Z01	bead, BK1005HM471
E452	2480640Z01	bead, BK1005HM471
E453	2480640Z01	bead, BK1005HM471
E500	2480640Z01	bead, BK1005HM471
F301	6580542Z01	fuse, 3 amp
FL51	9180022M11	4-pole cyrstal filter, 44.85 MHz, MXF45
FL52	9180468V04	4-pole ceramic filter, 455 kHz, CFU455F
FL53	9180469V05	6-pole ceramic filter, 455 kHz, CFWC455E
FL54	9180469V03	6-pole ceramic filter, 455 KHz, CFWC455G
J140	0986428Z01	connector, external antenna
J301	0986565Z01	battery contact assembly
J460	NOT PLACED	CONN_J
J470	0985818A01	connector, 2-pin, internal mic
J471	0980683Z03	connector, 2.5 / 3.5 mm, accessories
J491	2809926G01	connector, 2-pin, internal speaker
L1	2409348J15	IDCTR, 9.85nH
L2	2409348J15	IDCTR, 9.85nH
L3	2409348J15	IDCTR, 9.85nH
L21	2413926N16	IDCTR, 22nH
L31	2409348J15	IDCTR, 9.85nH
L32	2409348J15	IDCTR, 9.85nH
L33	2409348J15	IDCTR, 9.85nH
L34	2409348J15	IDCTR, 9.85nH
L40	2413926K16	IDCTR, 27nH
L41	2413926K16	IDCTR, 27nH
L51	2413926N26	IDCTR, 150nH
L52	2462587V44	IDCTR, 680nH
L53	2113743N52	CAP, 120pF
L54	2413923A25	IDCTR, 1.2uH
L55	2413926N16	IDCTR, 22nH
L81	2413923A19	IDCTR, 1uH
L100	2413926K27	IDCTR, 220nH
L101	2413926K27	IDCTR, 220nH
L102	2409377M21	IDCTR, 3.6nH
L103	2409377M24	IDCTR, 5.1nH
L110	2413926K27	IDCTR, 220nH
L120	2413926K27	IDCTR, 220nH
L121	2462587V24	IDCTR, 15nH
L130	2460591C40	IDCTR, 17.02nH
L131	2460591C40	IDCTR, 17.02nH
L132	2460591C40	IDCTR, 17.02nH
L140	2113740F42	CAP, 43pF
L141	2479990M01	IDCTR, 30.54nH
L211	2413926K30	IDCTR, 390nH
L251	2413926N28	IDCTR, 220nH
L252	2413926N17	IDCTR, 27nH
L254	2484562T11	IDCTR, 12.5nH
L255	2413926N28	IDCTR, 220nH
L262	2413926N17	IDCTR, 27nH
L264	2484562T11	IDCTR, 12.5nH
L265	2413926N28	IDCTR, 220nH
L270	2413926N28	IDCTR, 220nH
L271	NOT PLACED	IDCTR, 220nH
L272	2413926N28	IDCTR, 220nH
L276	2413926N17	IDCTR, 27nH
L281	2413926N17	IDCTR, 27nH
L282	2413926N14	IDCTR, 15nH
L283	NOT PLACED	IDCTR, 22nH
L291	2413926N10	IDCTR, 6.8nH
L292	2413926N14	IDCTR, 15nH
L471	2413926K30	IDCTR, 390nH
M140	0286427Z01	antenna nut
Q21	4802247J01	silicon NPN, BFS505
Q22	4805723X02	dual silicon PNP, UMT1
Q51	4802197J95	silicon NPN, PBR941
Q70	4880214G02	silicon NPN, MMBT3904
Q100	4885593U03	silicon NPN, BFG540W
Q150	4880214G02	silicon NPN, MMBT3904
Q170	4809939C34	dual silicon PNP, EMB10
Q171	4880048M01	digital NPN, DTC144EKA
Q280	4802245J95	silicon, NPN, BFS540
Q311	4809579E18	P-channel MOSFET, TP0101T
Q312	4809579E18	P-channel MOSFET, TP0101T
Q313	4802245J54	dual digital NPN, UMG5
Q402	4880048M01	digital NPN, DTC144EKA
Q403	4813824A17	silicon PNP, MMBT3906
Q410	4802245J54	dual digiial NPN, UMG5
Q440	5180159R01	dual NPN, IMX1
Q470	4805723X02	dual silicon PNP, UMT1
Q471	4802245J54	dual digital NPN, UMG5
Q472	4805723X02	dual silicon PNP, UMT1

Circuit Ref	Motorola Part No.	Description
Q481	NOT PLACED	MMBT3906
Q482	NOT PLACED	MMBT3904
Q490	4802245J54	dual digital NPN, UMG5
Q493	4809579E18	P-channel MOSFET, TP0101T
Q494	4802245J54	dual digital NPN, UMG5
Q520	5180159R01	dual NPN, IMX1
R20	0662057M92	RES, 5.6K
R21	0662057M48	RES, 82
R22	0662057M92	RES, 5.6K
R23	0662057N09	RES, 27K
R24	0662057M78	RES, 1.5K
R25	0662057M92	RES, 5.6K
R40	0662057M74	RES, 1K
R51	0662057M43	RES, 51
R52	0662057N01	RES, 12K
R53	0662057N11	RES, 33K
R54	0662057M91	RES, 5.1K
R55	0662057M62	RES, 330
R57	0662057M90	RES, 4.7K
R60	0662057M83	RES, 2.4K
R61	0662057N23	RES, 100K
R62	0662057M86	RES, 3.3K
R63	0662057N13	RES, 39K
R64	0662057N06	RES, 20K
R65	0662057N13	RES, 39K
R66	0662057N06	RES, 20K
R67	0662057N06	RES, 20K
R72	0662057M64	RES, 390
R73	0662057M80	RES, 1.8K
R74	0662057M76	RES, 1.2K
R75	0662057N01	RES, 12K
R76	0662057V04	RES, 12K
R77	0662057U99	RES, 8.2K
R78	0662057M70	RES, 680
R80	0662057M91	RES, 5.1K
R81	0662057M74	RES, 1K
R82	NOT PLACED	RES, 0
R90	0662057M43	RES, 51
R91	0662057M79	RES, 1.6K
R100	0662057M72	RES, 820
R101	0662057M20	RES, 5.6
R102	0662057M72	RES, 820
R103	0662057M85	RES, 3K
R104	0662057A07	RES, 18
R105	0662057M84	RES, 2.7K
R106	0662057M90	RES, 4.7K
R107	NOT PLACED	RES, 300
R110	0662057M70	RES, 680
R111	0662057M81	RES, 2K
R120	0662057C55	RES, 150
R121	0662057C55	RES, 150
R150	0680539Z01	RES, 0.1
R151	0662057A15	RES, 39
R152	0662057V27	RES, 100K
R153	0662057V27	RES, 100K
R154	0662057V27	RES, 100K
R155	0662057V27	RES, 100K
R156	0662057M62	RES, 330
R157	0662057M82	RES, 2.2K
R158	0662057M78	RES, 1.5K
R162	0662057M98	RES, 10K
R202	0662057N27	RES, 150K
R205	0662057M50	RES, 100
R206	NOT PLACED	RES, 100
R212	0662057C01	RES, 0
R220	0662057M49	RES, 91
R221	0662057M49	RES, 91
R223	0662057M50	RES, 100
R227	NOT PLACED	RES, 150K
R230	0662057N07	RES, 22K
R243	0662057M72	RES, 820
R244	0662057M43	RES, 51
R245	0662057M78	RES, 1.5K
R246	0662057N23	RES, 100K
R247	0662057N15	RES, 47K
R253	0662057M38	RES, 33
R254	0662057M50	RES, 100
R255	0662057U91	RES, 3.9K
R261	0662057N07	RES, 22K
R262	0662057M94	RES, 6.8K
R263	0662057M38	RES, 33
R264	0662057M50	RES, 100
R271	0662057M91	RES, 5.1K
R272	0662057M92	RES, 5.6K
R273	0662057M62	RES, 330
R274	0662057M38	RES, 33
R275	0662057M50	RES, 100
R276	0662057M74	RES, 1K
R277	0662057B47	RES, 0
R280	0662057M90	RES, 4.7K
R281	0662057M96	RES, 8.2K
R282	0662057M73	RES, 910
R283	0662057M54	RES, 150
R284	0662057M58	RES, 220
R285	0662057M01	RES, 0
R310	0662057N23	RES, 100K
R311	0662057N23	RES, 100K
R312	0662057N06	RES, 20K
R313	0662057M98	RES, 10K
R320	0662057V43	RES, 330K
R321	0662057V35	RES, 200K
R322	0662057N23	RES, 100K
R400	NOT PLACED	RES, 100K
R410	0662057M98	RES, 10K
R411	0662057M72	RES, 820
R412	0662057N23	RES, 100K
R413	0662057N23	RES, 100K
R414	0662057N11	RES, 33K
R415	0662057N11	RES, 33K
R416	0662057N06	RES, 20K
R417	0662057M98	RES, 10K
R418	0662057N23	RES, 100K
R419	0662057M90	RES, 4.7K
R420	0662057V35	RES, 200K
R421	0662057V27	RES, 100K
R422	0662057N23	RES, 100K
R423	0662057N23	RES, 100K
R424	0662057V35	RES, 200K
R425	0662057V27	RES, 100K
R430	0662057N23	RES, 100K
R431	NOT PLACED	RES, 100K
R432	0662057M01	RES, 0
R433	0662057N23	RES, 100K
R434	NOT PLACED	RES, 100K
R440	0662057M90	RES, 4.7K
R441	0662057M90	RES, 4.7K
R442	0662057A33	RES, 220
R443	0662057A27	RES, 120
R445	0662057M90	RES, 4.7K
R446	0662057M98	RES, 10K
R451	0662057N15	RES, 47K
R460	0662057N08	RES, 24K
R462	0662057N08	RES, 24K
R463	0662057N08	RES, 24K
R464	0662057N10	RES, 30K
R469	0662057M26	RES, 10
R470	0662057M82	RES, 2.2K
R471	0662057M82	RES, 2.2K
R472	0662057M70	RES, 680
R473	0662057M70	RES, 680
R474	0662057A37	RES, 330
R475	0662057N29	RES, 180K
R476	0662057N23	RES, 100K
R477	0662057M82	RES, 2.2K
R478	0662057M82	RES, 2.2K
R479	0662057N23	RES, 100K
R480	0662057B47	RES, 0
R481	NOT PLACED	RES, 100K
R482	NOT PLACED	RES, 330K
R483	NOT PLACED	RES, 150K
R484	NOT PLACED	RES, 2.2K
R485	NOT PLACED	RES, 100K
R486	NOT PLACED	RES, 100K
R487	0662057M01	RES, 0
R488	0662057N35	RES, 330K
R489	NOT PLACED	RES, 91K
R490	NOT PLACED	RES, 2.2K
R491	0662057M01	RES, 0
R492	0662057N08	RES, 24K
R493	0662057N35	RES, 330K
R494	0662057V43	RES, 330K
R495	0662057M92	RES, 5.6K
R496	NOT PLACED	RES, 10K
R497	NOT PLACED	RES, 1MEG
R498	NOT PLACED	RES, 47K
R499	NOT PLACED	RES, 270K
R501	0662057M50	RES, 100
R502	0662057M50	RES, 100
R503	0662057M50	RES, 100
R504	0662057M50	RES, 100
R505	0662057M50	RES, 100
R506	0662057M50	RES, 100
R507	0662057M50	RES, 100
R508	0662057N23	RES, 100K
R509	0662057N23	RES, 100K
R510	0662057N35	RES, 330K
R511	0662057N23	RES, 100K
R512	0662057N27	RES, 150K
R513	0662057N23	RES, 100K
R514	0662057N23	RES, 100K
R515	0662057M01	RES, 0
R516	NOT PLACED	RES, 0
R517	NOT PLACED	RES, 0
R518	0662057N31	RES, 220K
R519	0662057N23	RES, 100K
R520	0662057N23	RES, 100K
R521	NOT PLACED	RES, 100K
R522	0662057N23	RES, 100K
R523	0662057M98	RES, 10K
S440	4080710Z22	switch, rotary 16-channel select
	or 4080710Z13	switch, rotary 4-channel select
S441	4070354A01	switch, pushbutton PTT
S442	4070354A01	switch, pushbutton, side option (lower)
S443	4070354A01	switch, pushbutton, side option (upper)
S444	1880619Z02	switch, rotary on-off, with 10K volume control
SH1	2686421Z01	shield, comp side, RF front end
SH40	2686419Z01	shield, solder side, first mixer

Circuit Ref	Motorola Part No.	Description
SH50	2686423Z01	shield, solder side, IFIC and 2nd LO cyrstal
SH52	2686424Z01	shield, solder side, high IF crystal filter
SH100	2686418Z01	shield, solder side, transmitter
SH200	2686424Z01	shield, solder side, synthe-sizer charge pump
SH201	2686423Z01	shield, comp side, synthesizer
SH250	2686425Z01	shield, comp side, VCO tank circuits
SH251	2686425Z01	shield, solder side, VCOBIC
SH253	2686422Z01	shield, comp side, VCO RX injection buffer
SH400	2686420Z01	shield, solder side, micropro-cessor
SH401	2686420Z01	shield, comp side, memory
T41	2580541Z02	transformer, balun
T42	2580541Z02	transformer, balun
U51	5186144B01	receiver system (IFIC), SA616
U52	5109522E10	triple inverter, TC7W04F
U110	0186438Z02	transmitter PA module, RA07M4452M_UHF
U150	5113818A01	dual op amp, LM2904
U151	2484657R01	bead, 57R01
U201*	5185963A27	freuqency synthesizer, 63A27
U251	5105750U54	VCO/buffer, 50U54
U310	5102478J01	5 V voltage reguator, TK71750S
U320	5185963A55	adjustable voltage regulator w/ reset, LP2986
U330	5102479J01	3 V voltage regulator, TK71730S
U401*	5102226J56	microprocessor, MC68HC11FL0
U402*	5102463J64	serial EEPROM 16Kx8, X25128-2.7
U403	NOT PLACED	SRM2B256
U404*	5102480J01	Flash ROM 128Kx8, AT49LV001N_70VI
U451	5185130C53	audio filter (ASFIC_cmp), 30C53
U480	NOT PLACED	LM2904
U490	5108858K99	audio power amplifier, TDA8541
U510	5113818A01	dual op amp, LM2904
U511	4802245J54	dual digital NPN, UMG5
VR110	4813830A86	zener diode, 3.9 V, MM3Z3V9T1
VR301	4813830A33	zener diode, 20 V, MMBZ5250B
VR302	4813830A33	zener diode, 20 V, MMBZ5250B
VR471	4813830A18	zener diode, 6.8 V, MMBZ5235B
VR472	4813830A09	zener diode, 3.3 V, MMBZ5226B
VR473	4813830A33	zener diode 20 V, MMBZ5250B
VR474	4813830A33	zener diode, 20 V, MMBZ5250B
VR475	4880140L20	zener diode, 15 V, MMBZ5245B
Y51	4802245J84	crystal, 44.395 MHz, TSS2_44_395MHZ
Y70	9186145B02	ceramic discriminator, 455 kHz, 45B02
Y201*	4880114R06	crystal, 16.8 MHz, 14R06
Y202	NOT PLACED	45J68

* Motorola Depot Servicing only

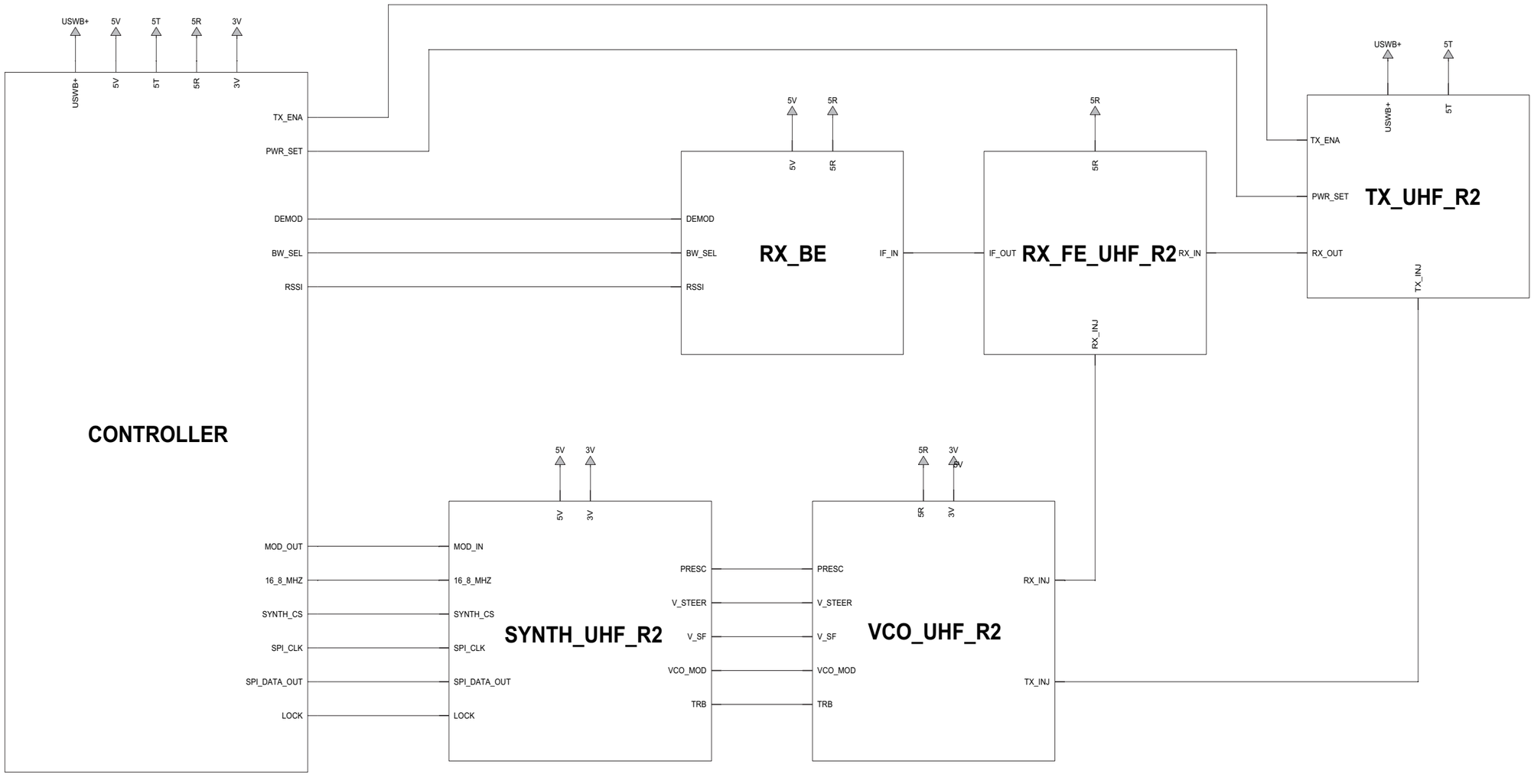


Figure 13-62. UHF (438–470 MHz) Radio Circuit Block Diagram (8416205H02-C/03-D)

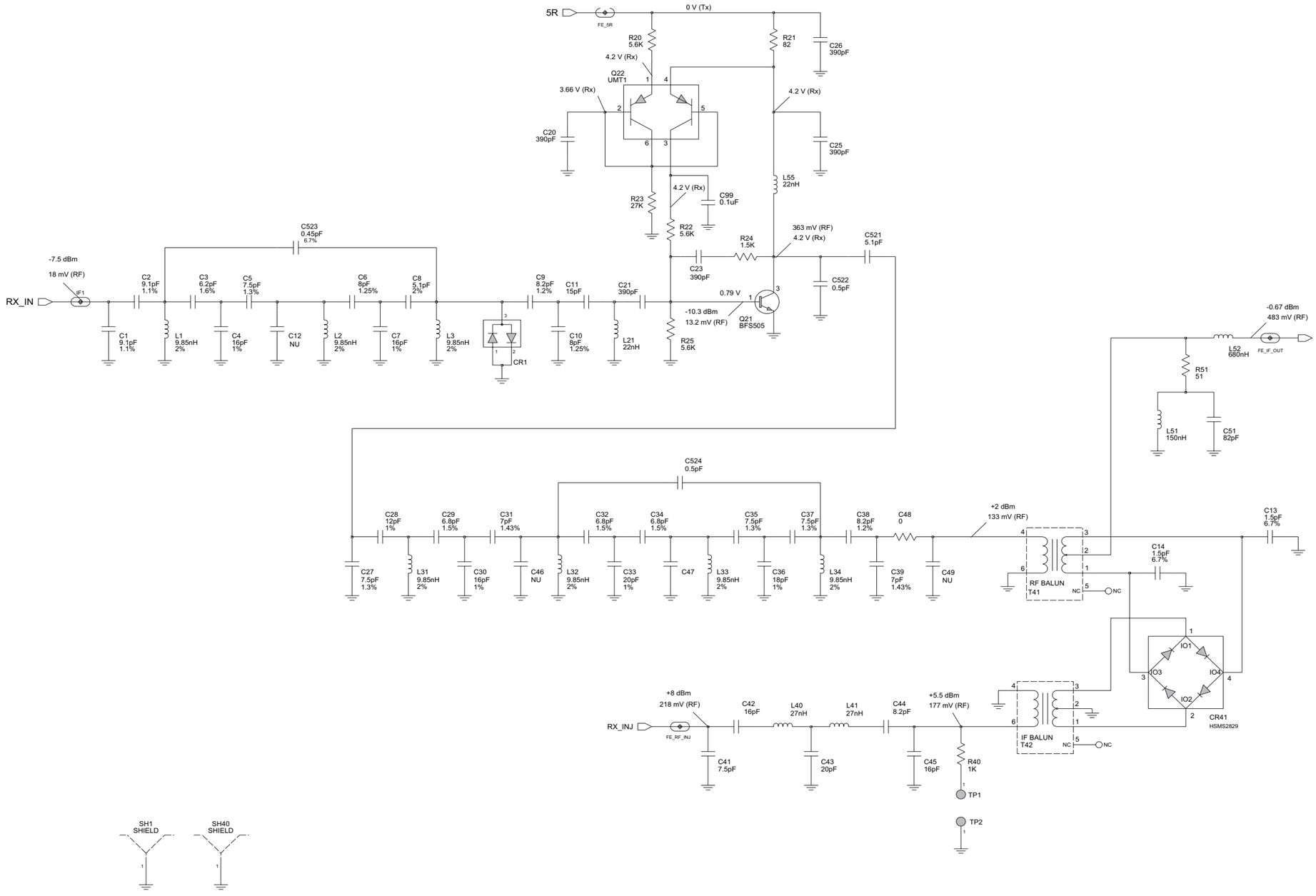


Figure 13-63. UHF (438–470 MHz) Receiver Front End Schematic Diagram (8416205H02-C/03-D)

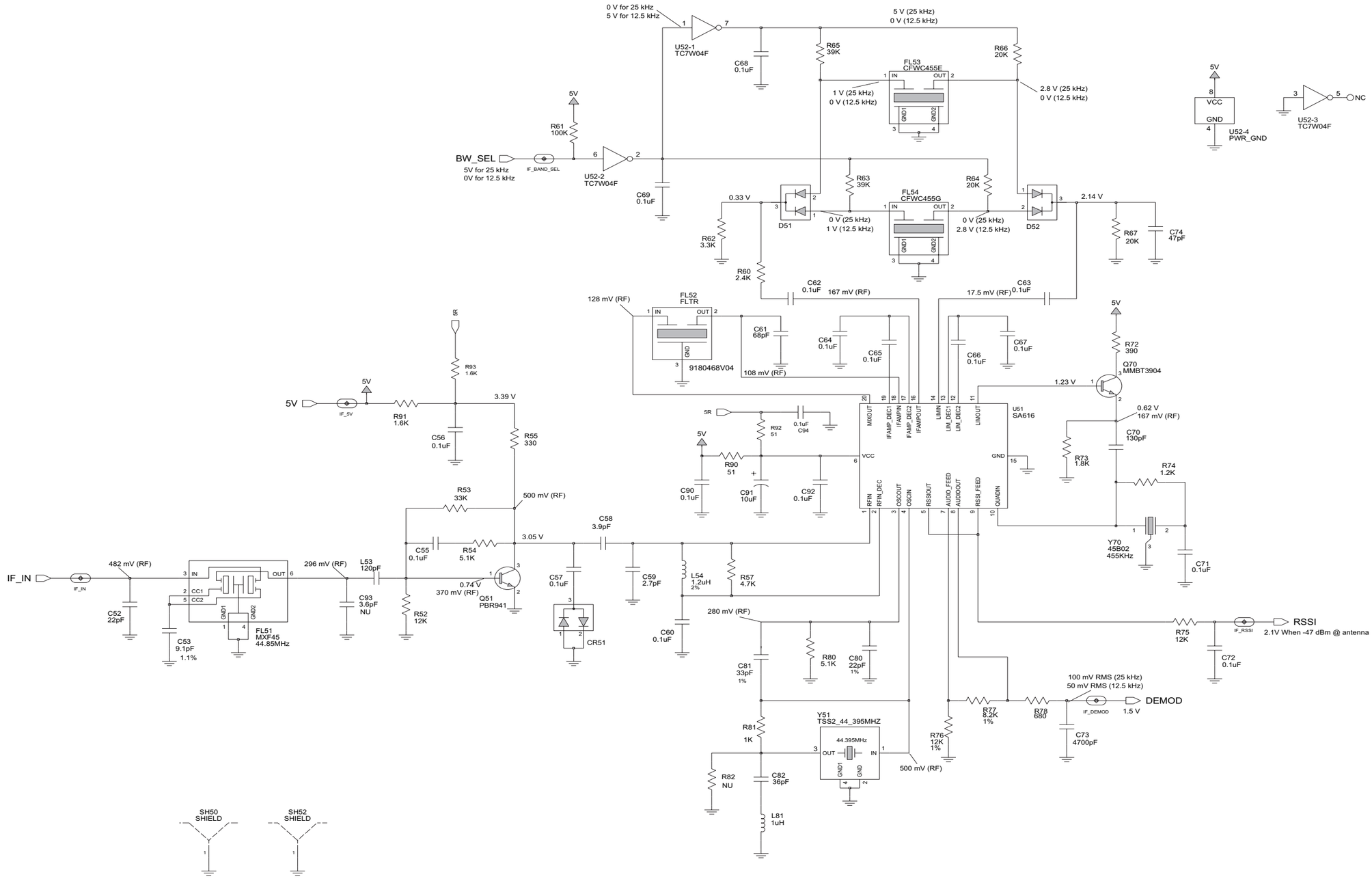
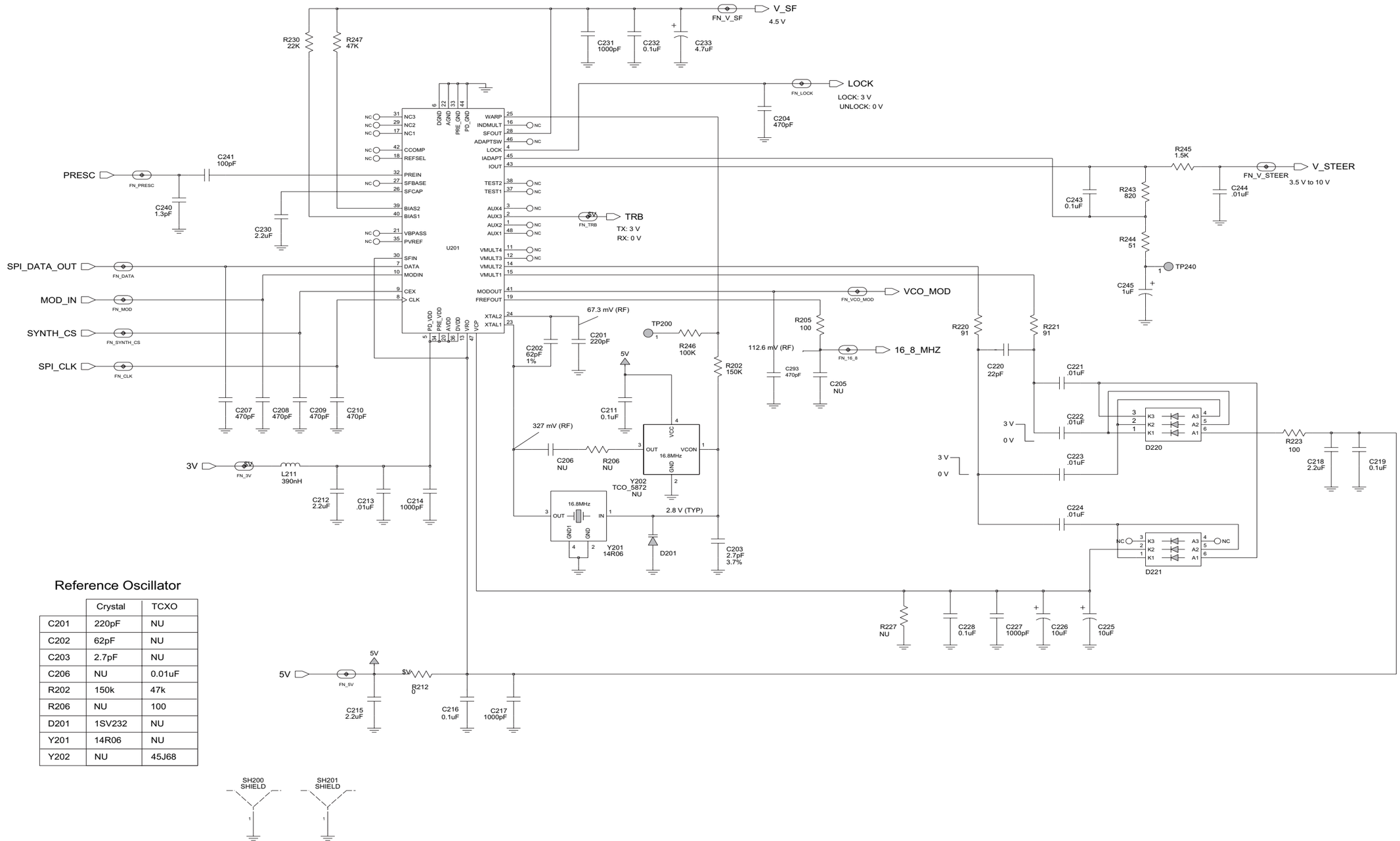


Figure 13-64. UHF (438–470 MHz) Receiver Back End Schematic Diagram (8416205H02-C/03-D)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 13-65. UHF (438–470 MHz) Synthesizer Schematic Diagram (8416205H02-C/03-D)

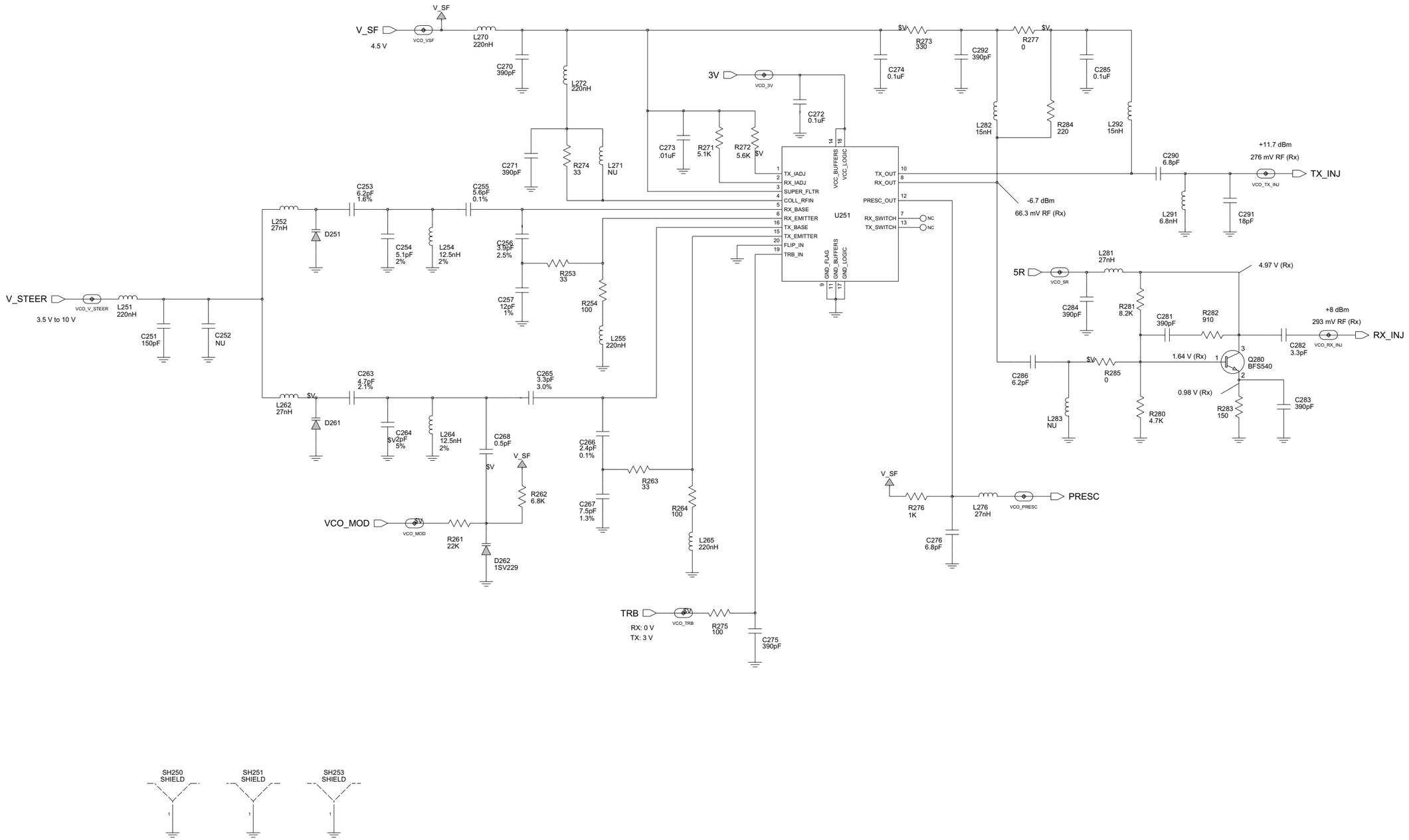


Figure 13-66. UHF (438–470 MHz) Voltage Controlled Oscillator Schematic Diagram (8416205H02-C/03-D)

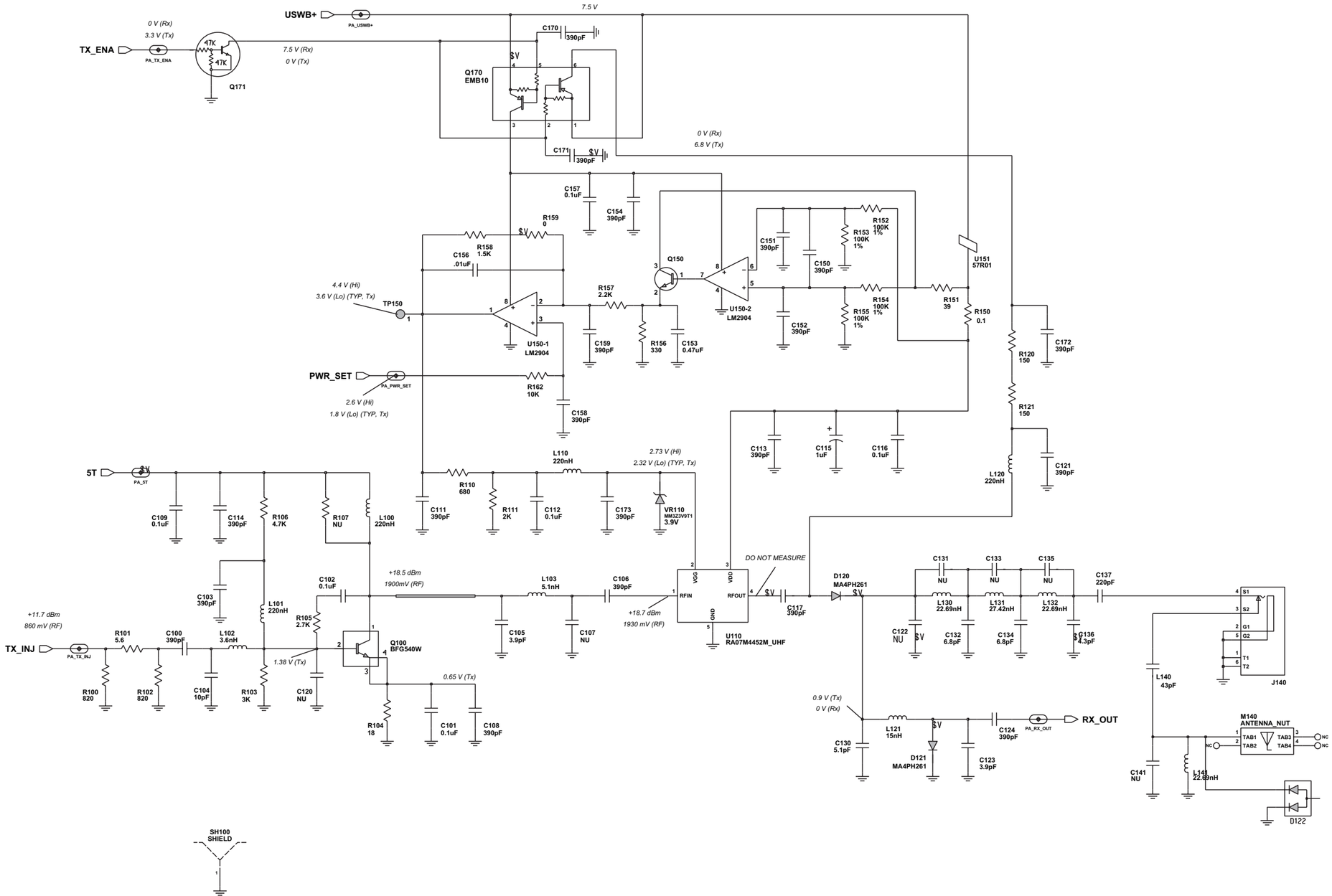


Figure 13-67. UHF (438–470 MHz) Transmitter and Power Control Schematic Diagram (8416205H02-C/03-D)

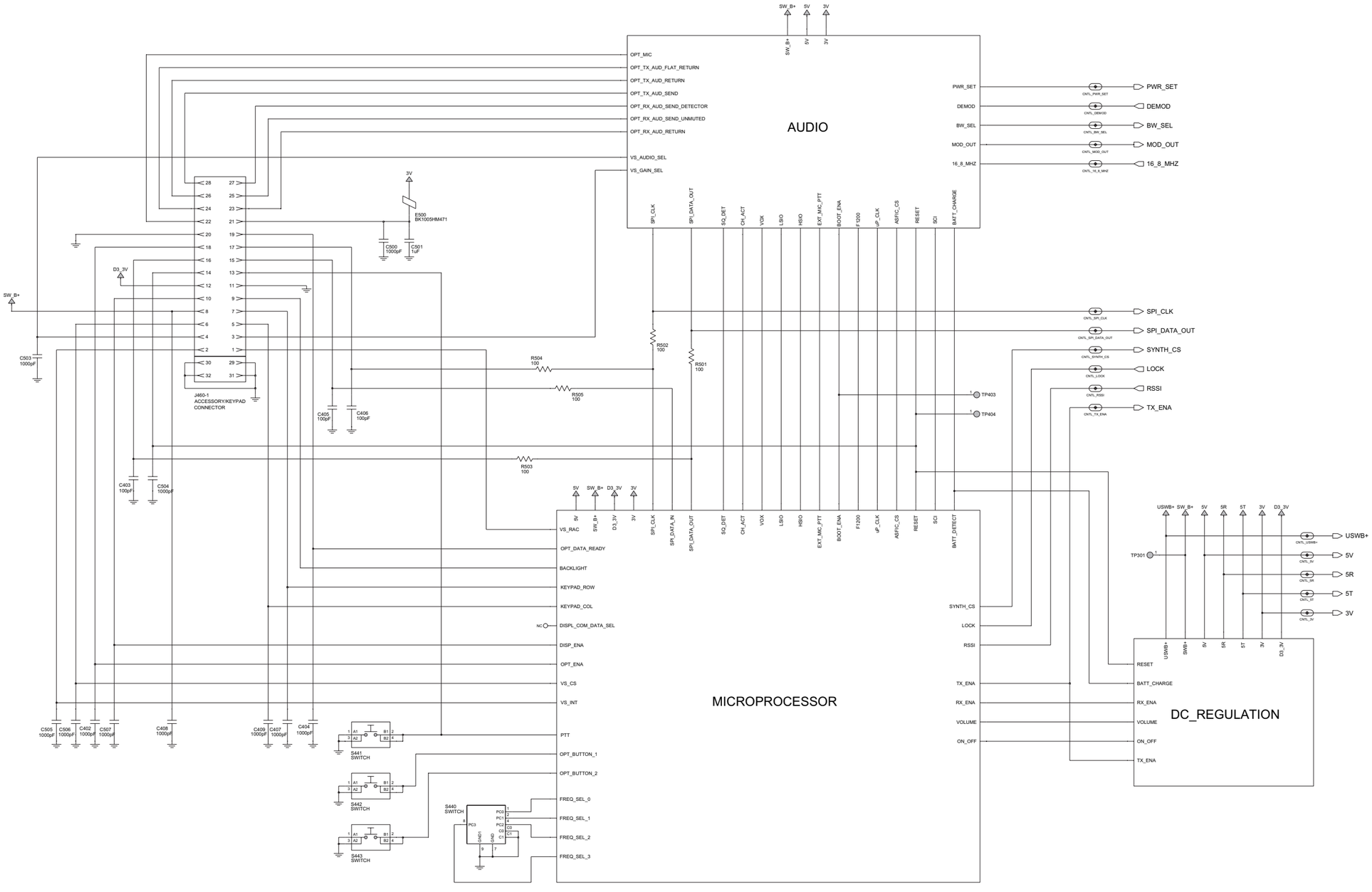


Figure 13-68. UHF (438–470 MHz) Controller Interconnect Schematic Diagram (8416205H02-C/03-D)

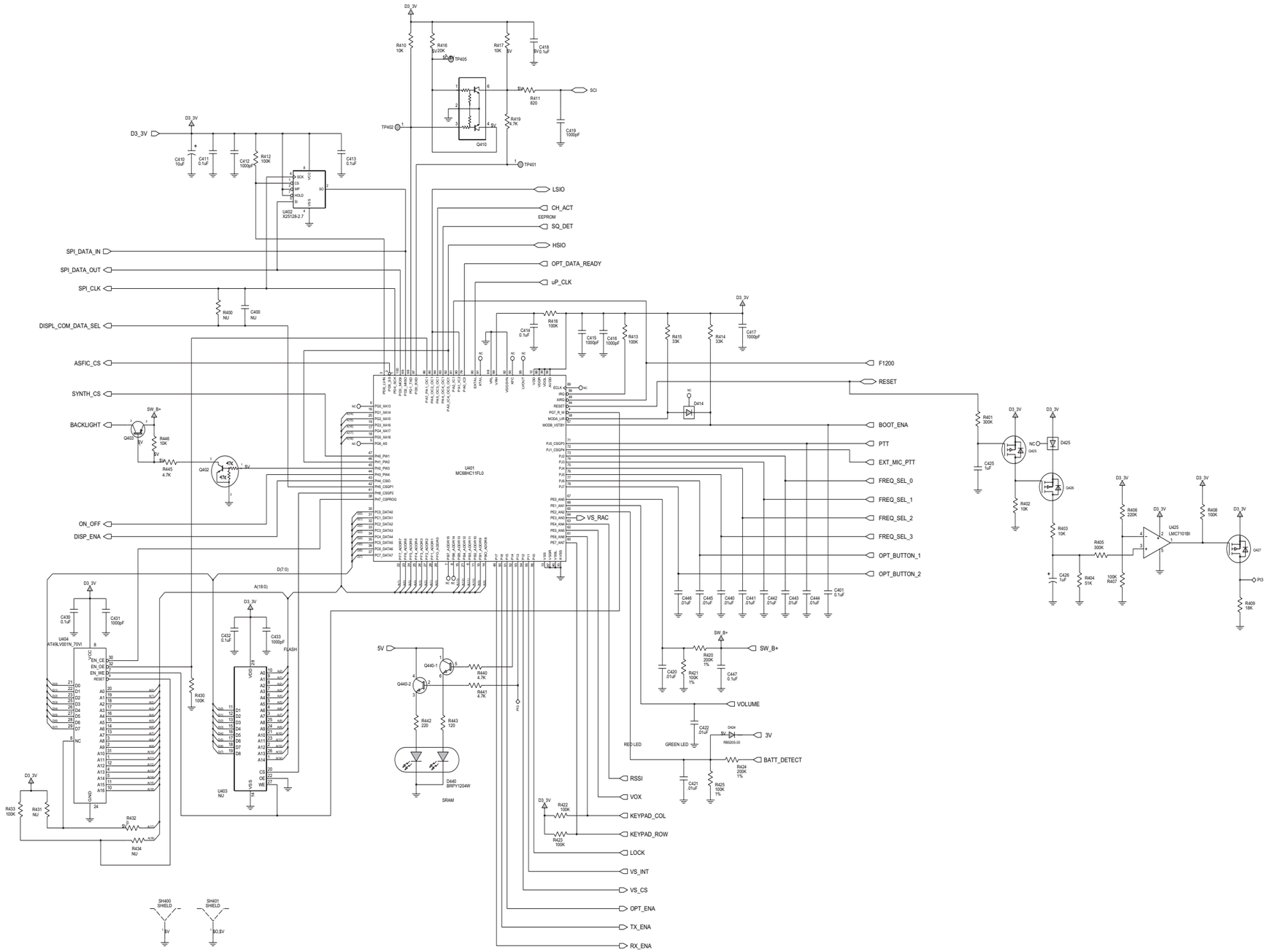


Figure 13-69. UHF (438–470 MHz) Microprocessor Circuitry Schematic Diagram (8416205H02-C/03-D)

	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

PLACEHOLDER

FOR 2113928H02

Figure 13-70. UHF (438–470 MHz) Audio Circuitry Schematic Diagram (8416205H02-C/03-D)

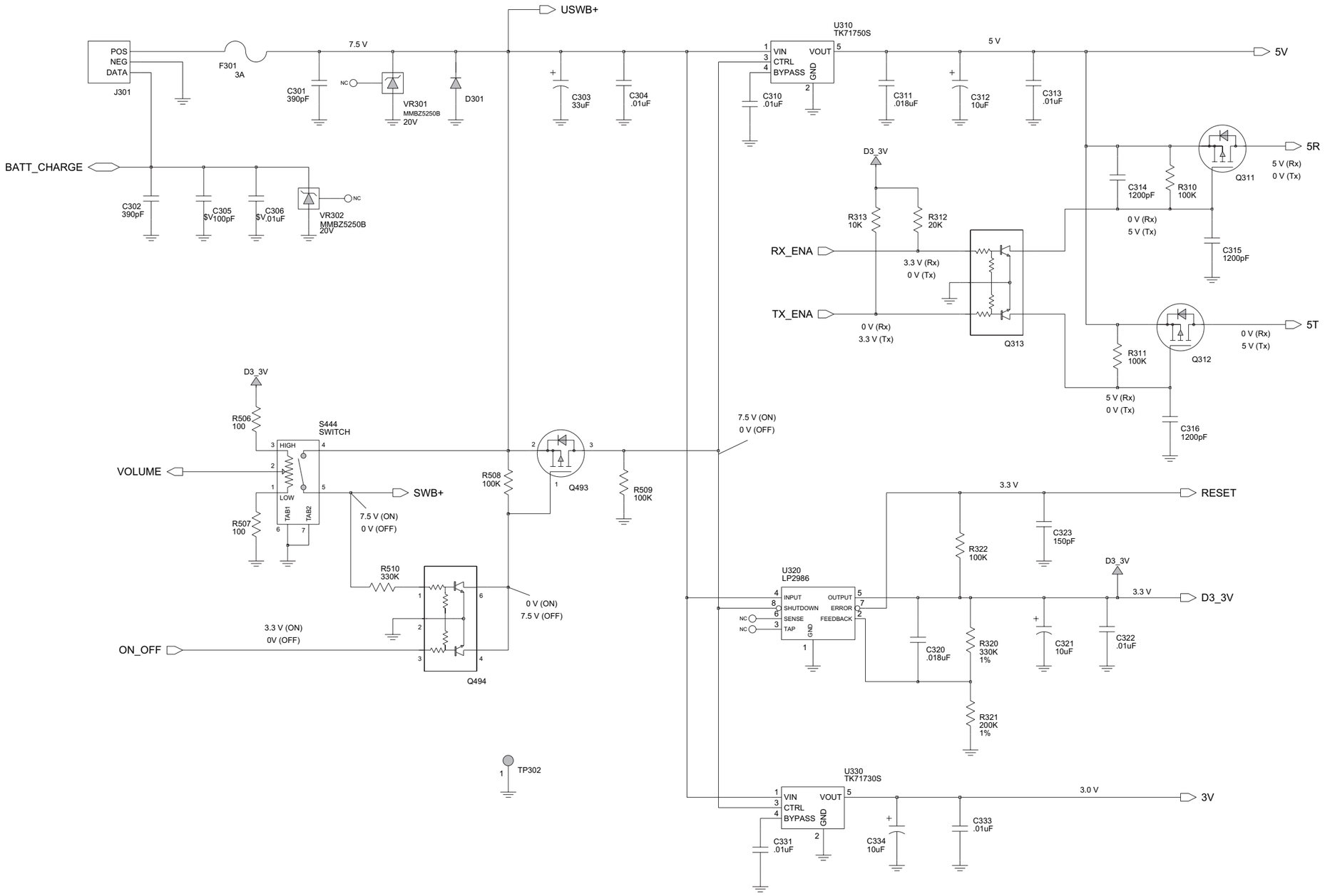
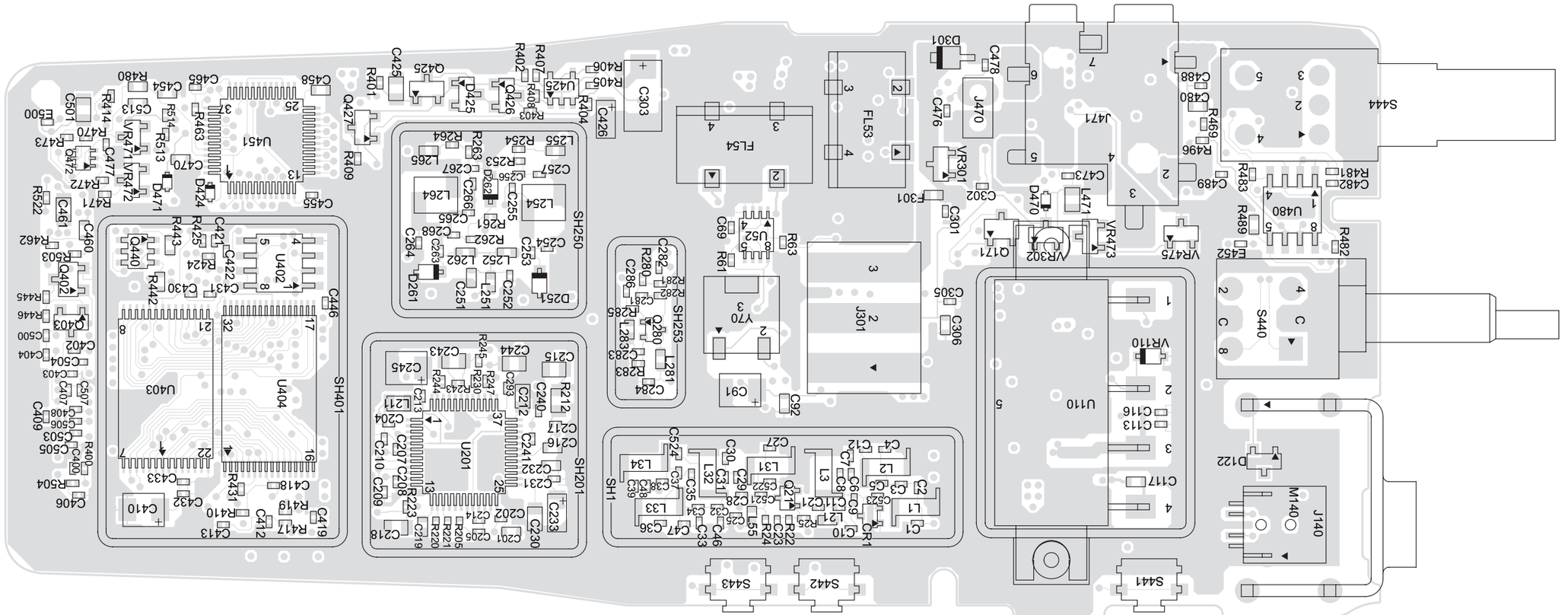


Figure 13-71. UHF (438–470 MHz) DC Regulation Schematic Diagram (8416205H02-C/03-D)


SH401
SH250
SH201
SH253
SH1
U451
U402
U403
U404
U201
U110
U480
J301
J470
J471
J140
M140
S444
S440
S441
S442
S443
FL54
FL53
F301
F452
D301
D470
D424
D425
D261
D251
D122
Q427
Q402
Q403
Q440
Q280
Q171
Q21
Y70
VR302
VR473
VR475
VR110
VR471
VR472
VR301
C303
C426
C425
C301
C302
C305
C306
C91
C92
C476
C478
C480
C488
C489
C482
C481
C483
C469
C496
C473
C471
C472
C477
C501
C513
C454
C465
C458
C455
C461
C460
C462
C463
C500
C504
C403
C507
C408
C506
C503
C505
C400
C406
C410
C412
C413
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C418
C417
C432
C433
C430
C431
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C425
C426
C427
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C429
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C485
C486

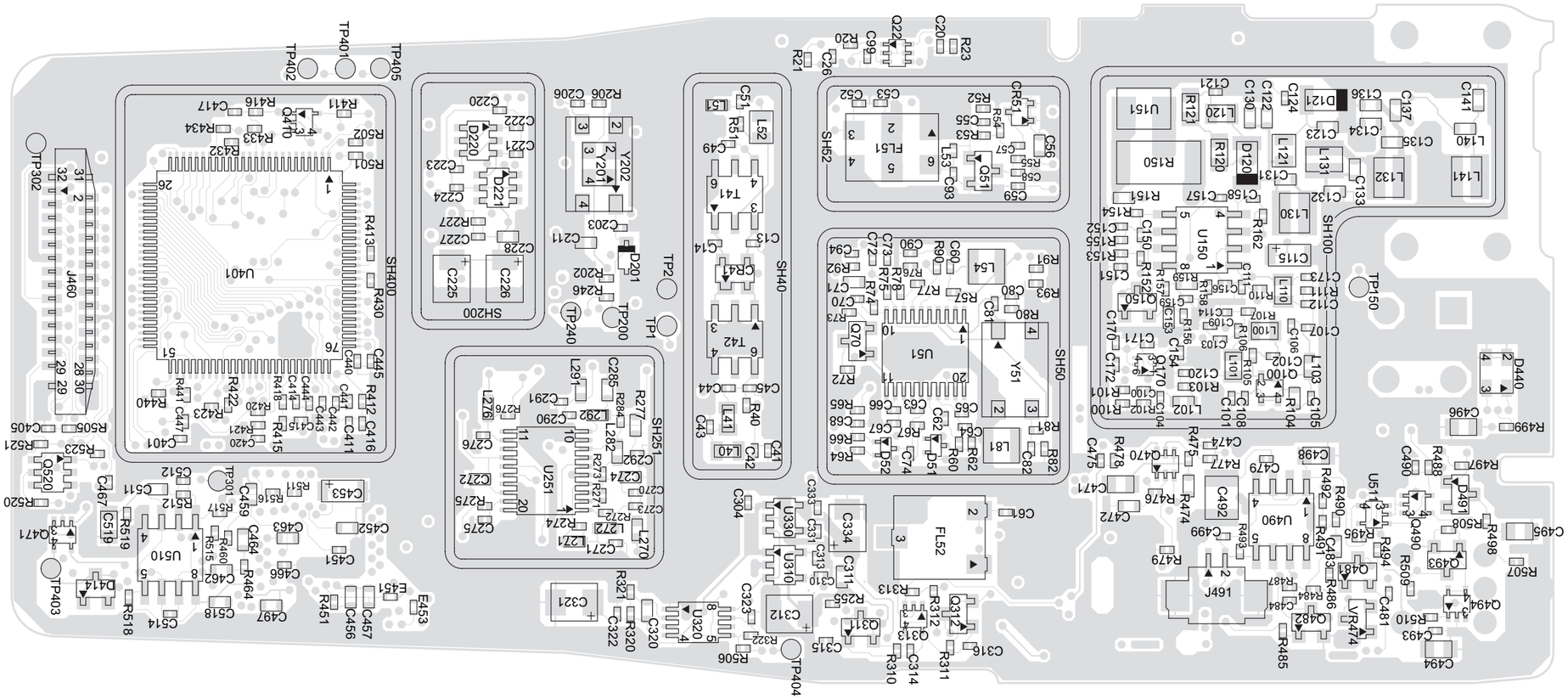


Figure 13-73. UHF (438–470 MHz) Board Solder Side View (8416205H02-C/03-D)

UHF (438–470 MHz) Radio Parts List (8416205H02-C/03-D)

Circuit Ref	Motorola Part No.	Description
C1	2115153H26	CAP, 9.1pF
C2	2115153H26	CAP, 9.1pF
C3	2115153H22	CAP, 6.2pF
C4	2115153H38	CAP, 16pF
C5	2115153H24	CAP, 7.5pF
C6	2115153H32	CAP, 8pF
C7	2115153H38	CAP, 16pF
C8	2115153H20	CAP, 5.1pF
C9	2115153H25	CAP, 8.2pF
C10	2115153H32	CAP, 8pF
C11	2113944A27	CAP, 15pF
C12	NOT PLACED	64AM DUMMY PART NUMBER
C13	2115153H07	CAP, 1.5pF
C14	2115153H07	CAP, 1.5pF
C20	2113945A04	CAP, 390pF
C21	2113945A04	CAP, 390pF
C23	2113945A04	CAP, 390pF
C25	2113945A04	CAP, 390pF
C26	2113945A04	CAP, 390pF
C27	2115153H26	CAP, 9.1pF
C28	2115153H35	CAP, 12pF
C29	2115153H23	CAP, 6.8pF
C30	2115153H38	CAP, 16pF
C31	2115153H31	CAP, 7pF
C32	2115153H23	CAP, 6.8pF
C33	2115153H40	CAP, 20pF
C34	2115153H23	CAP, 6.8pF
C35	2115153H24	CAP, 7.5pF
C36	2115153H39	CAP, 18pF
C37	2115153H24	CAP, 7.5pF
C38	2115153H25	CAP, 8.2pF
C39	2115153H31	CAP, 7pF
C41	2113944A22	CAP, 7.5pF
C42	2113944A79	CAP, 16pF
C43	2113944A80	CAP, 20pF
C44	2113944A23	CAP, 8.2pF
C45	2113944A79	CAP, 16pF
C46	NOT PLACED	64AM DUMMY PART NUMBER
C47	NOT PLACED	64AM DUMMY PART NUMBER
C48	0613952R66	RES, 0
C49	NOT PLACED	64AM DUMMY PART NUMBER
C51	2113944A38	CAP, 82pF
C52	2115153H41	CAP, 22pF
C53	2115153H26	CAP, 9.1pF
C55	2113946K02	CAP, 0.1uF
C56	2113945C31	CAP, 0.1uF
C57	2113946K02	CAP, 0.1uF
C58	2113944A15	CAP, 3.9pF
C59	2113944A11	CAP, 2.7pF
C60	2113946K02	CAP, 0.1uF
C61	2113944A36	CAP, 68pF
C62	2113946K02	CAP, 0.1uF
C63	2113946K02	CAP, 0.1uF
C64	2113946K02	CAP, 0.1uF
C65	2113946K02	CAP, 0.1uF
C66	2113946K02	CAP, 0.1uF
C67	2113946K02	CAP, 0.1uF
C68	2113946K02	CAP, 0.1uF
C69	2113946K02	CAP, 0.1uF
C70	2113944A87	CAP, 130pF
C71	2113945C31	CAP, 0.1uF
C72	2113946K02	CAP, 0.1uF
C73	2113945A13	CAP, 4700pF
C74	2113944A33	CAP, 47pF
C80	2115153H41	CAP, 22pF
C81	2115153H45	CAP, 33pF
C82	2115153H46	CAP, 36pF
C90	2113946K02	CAP, 0.1uF
C91	2313960D07	CAP, 10uF
C92	2113945C31	CAP, 0.1uF
C93	NOT PLACED	64AM DUMMY PART NUMBER
C99	2113946K02	CAP, 0.1uF
C100	2113945A04	CAP, 390pF
C101	2113946K02	CAP, 0.1uF
C102	2113946K02	CAP, 0.1uF
C103	2113945A04	CAP, 390pF
C104	2113944A25	CAP, 10pF
C105	2113944A15	CAP, 3.9pF
C106	2113945A04	CAP, 390pF
C107	NOT PLACED	64AM DUMMY PART NUMBER
C108	2113945A04	CAP, 390pF
C109	2113946K02	CAP, 0.1uF
C111	2113945A04	CAP, 390pF
C112	2113946K02	CAP, 0.1uF
C113	2113945A04	CAP, 390pF
C114	2113945A04	CAP, 390pF
C115	2313960B01	CAP, 1uF
C116	2113946K02	CAP, 0.1uF
C117	2113944C05	CAP, 390pF
C120	NOT PLACED	64AM DUMMY PART NUMBER
C121	2113945A04	CAP, 390pF
C122	NOT PLACED	64AM DUMMY PART NUMBER
C123	2113944C20	CAP, 3.9pF
C124	2113945A04	CAP, 390pF
C130	2113944C70	CAP, 5.1pF
C131	NOT PLACED	64AM DUMMY PART NUMBER
C132	2113944C73	CAP, 6.8pF
C133	NOT PLACED	64AM DUMMY PART NUMBER
C134	2113944C73	CAP, 6.8pF
C135	NOT PLACED	64AM DUMMY PART NUMBER
C136	2113944C21	CAP, 4.3pF
C137	2113944C02	CAP, 220pF
C141	NOT PLACED	64AM DUMMY PART NUMBER
C150	2113945A04	CAP, 390pF
C151	2113945A04	CAP, 390pF
C152	2113945A04	CAP, 390pF
C153	2113946L04	CAP, 0.47uF
C154	2113945A04	CAP, 390pF
C155	2113945C31	CAP, 0.1uF
C156	2113945B02	CAP, 10000pF
C157	2113946K02	CAP, 0.1uF
C158	2113945A04	CAP, 390pF
C159	2113945A04	CAP, 390pF
C170	2113945A04	CAP, 390pF
C171	2113945A04	CAP, 390pF
C172	2113945A04	CAP, 390pF
C173	2113945A04	CAP, 390pF
C201	2113944C02	CAP, 220pF
C202	2115153H52	CAP, 62pF
C203	2115153H13	CAP, 2.7pF
C204	2113945A05	CAP, 470pF
C205	NOT PLACED	64AM DUMMY PART NUMBER
C206	NOT PLACED	64AM DUMMY PART NUMBER
C207	2113945A05	CAP, 470pF
C208	2113945A05	CAP, 470pF
C209	2113945A05	CAP, 470pF
C210	2113945A05	CAP, 470pF
C211	2113945C31	CAP, 0.1uF
C212	2113946N03	CAP, 2.2uF
C213	2113945B02	CAP, 10000pF
C214	2113945A09	CAP, 1000pF
C215	2113946N03	CAP, 2.2uF
C216	2113945C31	CAP, 0.1uF
C217	2113945A09	CAP, 1000pF
C218	2113946N03	CAP, 2.2uF
C219	2113945C31	CAP, 0.1uF
C220	2113944A29	CAP, 22pF
C221	2113945B02	CAP, 10000pF
C222	2113945B02	CAP, 10000pF
C223	2113945B02	CAP, 10000pF
C224	2113945B02	CAP, 10000pF
C225	2313960D07	CAP, 10uF
C226	2313960D07	CAP, 10uF
C227	2113945A09	CAP, 1000pF
C228	2113945C31	CAP, 0.1uF
C230	2113946N03	CAP, 2.2uF
C231	2113945A09	CAP, 1000pF
C232	2113945C31	CAP, 0.1uF
C233	2313960B30	CAP, 4.7uF
C240	2113944A03	CAP, 1.3pF
C241	2113944A40	CAP, 100pF
C243	0886641Z01	CAP, 0.1uF
C244	0888600M25	CAP, 10nF
C245	2313960C26	CAP, 1uF
C251	0888600M03	CAP, 0.15nF
C252	NOT PLACED	64AM DUMMY PART NUMBER
C253	2115153H22	CAP, 6.2pF
C254	2115153H20	CAP, 5.1pF
C255	2115153H21	CAP, 5.6pF
C256	2115153H17	CAP, 3.9pF
C257	2115153H35	CAP, 12pF
C263	2115153H19	CAP, 4.7pF
C264	2115153H10	CAP, 2pF
C265	2115153H15	CAP, 3.3pF
C266	2115153H12	CAP, 2.4pF
C267	2115153H24	CAP, 6.8pF
C268	2115153H01	CAP, 0.5pF
C270	2113945A04	CAP, 390pF
C271	2113945A04	CAP, 390pF
C272	2113945C31	CAP, 0.1uF
C273	2113945B02	CAP, 10000pF
C274	2113945C31	CAP, 0.1uF
C275	2113945A04	CAP, 390pF
C276	2113944A21	CAP, 6.8pF
C281	2113945A04	CAP, 390pF
C282	2113944A13	CAP, 3.3pF
C283	2113945A04	CAP, 390pF
C284	2113945A04	CAP, 390pF
C285	2113945C31	CAP, 0.1uF
C286	2113944A20	CAP, 6.2pF
C290	2113944A21	CAP, 6.8pF
C291	2113944A28	CAP, 18pF
C292	2113945A04	CAP, 390pF
C293	2113945A05	CAP, 470pF
C301	2113945A04	CAP, 390pF
C302	2113945A04	CAP, 390pF
C303	2313960F04	CAP, 33uF

Circuit Ref	Motorola Part No.	Description
C304	2113945B02	CAP, 10000pF
C305	2113944A40	CAP, 100pF
C306	2113945L49	CAP, 0.1uF
C310	2113945B02	CAP, 10000pF
C311	2113945C21	CAP, 0.018uF
C312	2313960D07	CAP, 10uF
C313	2113945B02	CAP, 10000pF
C314	2113945A60	CAP, 1200pF
C315	2113945A60	CAP, 1200pF
C316	2113945A60	CAP, 1200pF
C320	2113945C21	CAP, 0.018uF
C321	2313960D07	CAP, 10uF
C322	2113945B02	CAP, 10000pF
C323	2113944A42	CAP, 150pF
C331	2113945B02	CAP, 10000pF
C333	2113945B02	CAP, 10000pF
C334	2313960D07	CAP, 10uF
C400	NOT PLACED	64AM DUMMY PART NUMBER
C401	2113946K02	CAP, 0.1uF
C402	2113945A09	CAP, 1000pF
C403	2113944A40	CAP, 100pF
C404	2113945A09	CAP, 1000pF
C405	2113944A40	CAP, 100pF
C406	2113944A40	CAP, 100pF
C407	2113945A09	CAP, 1000pF
C408	2113945A09	CAP, 1000pF
C409	2113945A09	CAP, 1000pF
C410	2313960D07	CAP, 10uF
C411	2113946K02	CAP, 0.1uF
C412	2113945A09	CAP, 1000pF
C413	2113946K02	CAP, 0.1uF
C414	2113946K02	CAP, 0.1uF
C415	2113945A09	CAP, 1000pF
C416	2113945A09	CAP, 1000pF
C417	2113945A09	CAP, 1000pF
C418	2113946K02	CAP, 0.1uF
C419	2113945A09	CAP, 1000pF
C420	2113945B02	CAP, 10000pF
C421	2113945B02	CAP, 10000pF
C422	2113945B02	CAP, 10000pF
C425	2113946E02	CAP, 1uF
C426	2313960B01	CAP, 1uF
C430	2113946K02	CAP, 0.1uF
C431	2113945A09	CAP, 1000pF
C432	2113946K02	CAP, 0.1uF
C433	2113945A09	CAP, 1000pF
C440	2113945B02	CAP, 10000pF
C441	2113945B02	CAP, 10000pF
C442	2113945B02	CAP, 10000pF
C443	2113945B02	CAP, 10000pF
C444	2113945B02	CAP, 10000pF
C445	2113945B02	CAP, 10000pF
C446	2113945B02	CAP, 10000pF
C447	2113946K02	CAP, 0.1uF
C451	2113946K02	CAP, 0.1uF
C452	2113945C31	CAP, 0.1uF
C453	2313960B30	CAP, 4.7uF
C454	2113945C31	CAP, 0.1uF
C455	2113945B04	CAP, 0.022uF
C456	2113945C31	CAP, 0.1uF
C457	2113945C31	CAP, 0.1uF
C458	2113945C31	CAP, 0.1uF
C459	2113945C31	CAP, 0.1uF
C460	2113945C31	CAP, 0.1uF
C461	2113946F03	CAP, 4.7uF
C462	2113945C31	CAP, 0.1uF
C463	2113945C31	CAP, 0.1uF
C464	2113945C31	CAP, 0.1uF
C465	2113945A09	CAP, 1000pF
C466	NOT PLACED	64AM DUMMY PART NUMBER
C467	2113945A60	CAP, 1200pF
C470	2113945C31	CAP, 0.1uF
C471	2113946N03	CAP, 2.2uF
C472	2113945C31	CAP, 0.1uF
C473	2113944A42	CAP, 150pF
C474	2113944A42	CAP, 150pF
C475	2113945B04	CAP, 0.022uF
C476	2113945B04	CAP, 0.022uF
C477	2113946K02	CAP, 0.1uF
C478	2113944A42	CAP, 150pF
C479	2113944A42	CAP, 150pF
C480	2113945C31	CAP, 0.1uF
C481	NOT PLACED	64AM DUMMY PART NUMBER
C482	NOT PLACED	64AM DUMMY PART NUMBER
C483	2113946C02	CAP, 0.22uF
C484	NOT PLACED	64AM DUMMY PART NUMBER
C488	2113945A05	CAP, 470pF
C489	2113945A05	CAP, 470pF
C490	2113945A05	CAP, 470pF
C492	2113955E37	CAP, 10uF
C493	2113945A09	CAP, 1000pF
C494	2113946N03	CAP, 2.2uF
C495	2113946N02	CAP, 1uF
C496	2113946N02	CAP, 1uF
C497	2113945C31	CAP, 0.1uF
C498	2113946N02	CAP, 1uF
C499	2113944A32	CAP, 39pF
C500	2113945A09	CAP, 1000pF
C501	2113946N02	CAP, 1uF
C503	2113945A09	CAP, 1000pF
C504	2113945A09	CAP, 1000pF
C505	2113945A09	CAP, 1000pF
C506	2113945A09	CAP, 1000pF
C507	2113945A09	CAP, 1000pF
C511	2113944C02	CAP, 220pF
C512	2113944A21	CAP, 6.8pF
C513	2113944C02	CAP, 220pF
C514	2113944A79	CAP, 16pF
C518	2113945C31	CAP, 0.1uF
C519	2113946N02	CAP, 1uF
C521	2115153H20	CAP, 5.1pF
C522	2115153H01	CAP, 0.5pF
C523	2186463Z02	CAP, 0.03pF
C524	2186463Z03	CAP, 0.03pF
CR1	4813974A19	DIODE, SCHOTTKY
CR41	4815923H01	DIODE, SCHOTTKY
CR51	4813974A19	DIODE, SCHOTTKY
D51	4815047H01	DIODE, SWITCHING
D52	4815047H01	DIODE, SWITCHING
D120	4880973Z02	DIODE, PIN
D121	4880973Z02	DIODE, PIN
D122	4813978C06	DIODE, MMBD2836LT1
D201	4815072H01	DIODE, VARACTOR
D220	4815011H01	DIODE, TRIPLE
D221	4815011H01	DIODE, TRIPLE
D251	4885055Y01	DIODE, VARACTOR
D261	4885055Y01	DIODE, VARACTOR
D262	4885055Y01	DIODE, VARACTOR
D301	4815713H01	DIODE, SCHOTTKY
D414	4805129M41	SOT SMBD1022 RH29M19 LH
D424	4809924D29	DIODE, HIGH VOLTAGE
D425	4805129M41	SOT SMBD1022 RH29M19 LH
D440	4805729G49	DIODE, RED/YEL
D470	4809924D29	DIODE, HIGH VOLTAGE
D471	4809924D29	DIODE, HIGH VOLTAGE
D491	NOT PLACED	64AM DUMMY PART NUMBER
E451	2480640Z01	FERRITE BEAD
E452	2480640Z01	FERRITE BEAD
E453	2480640Z01	FERRITE BEAD
E500	2480640Z01	FERRITE BEAD
F301	6515076H01	FUSE CHIP SMT
FL51	9186801Z01	XTAL OSC, 44.85MHZ
FL52	9180468V04	CER FLTR, 4 ELEMENT
FL53	9115811H03	CER FLTR, 6 ELEMENT
FL54	9115811H01	CER FLTR, 6 ELEMENT
J140	0986428Z02	RF JACK
J301	0986565Z02	BATTERY CONN
J460	NOT PLACED	64AM DUMMY PART NUMBER
J470	0985818A02	2 PIN CONN
J471	0980683Z03	AUDIO JACK
J491	2815162H01	CONN_P
L1	2415428H08	INDCTR, 9.85nH
L2	2415428H08	INDCTR, 9.85nH
L3	2415428H08	INDCTR, 9.85nH
L21	2414017N16	INDCTR, 22nH
L31	2415428H08	INDCTR, 9.85nH
L32	2415428H08	INDCTR, 9.85nH
L33	2415428H08	INDCTR, 9.85nH
L34	2415428H08	INDCTR, 9.85nH
L40	2414017K16	INDCTR, 27nH
L41	2414017K16	INDCTR, 27nH
L51	2414017N26	INDCTR, 150nH
L52	2414017K32	INDCTR, 560nH
L53	2113944A41	CAP, 120pF
L54	2414015A25	INDCTR, 1.2uH
L55	2414017N16	INDCTR, 22nH
L81	2414015A19	INDCTR, 1uH
L100	2414017K27	INDCTR, 220nH
L101	2414017K27	INDCTR, 220nH
L102	2415429H04	INDCTR, 3.6nH
L103	2415429H08	INDCTR, 5.1nH
L110	2414017K27	INDCTR, 220nH
L120	2414017K27	INDCTR, 220nH
L121	2414032F24	INDCTR, 15nH
L130	2460591C40	INDCTR, 17.02nH
L131	2460591C40	INDCTR, 17.02nH
L132	2460591C40	INDCTR, 17.02nH
L140	2113944C84	CAP, 43pF
L141	2479990M01	INDCTR, 30.54nH
L211	2414017K30	INDCTR, 390nH
L251	2414017N28	INDCTR, 220nH
L252	2414017N17	INDCTR, 27nH
L254	2415385H02	INDCTR, 12.5nH
L255	2414017N28	INDCTR, 220nH
L262	2414017N17	INDCTR, 27nH
L264	2415385H02	INDCTR, 12.5nH
L265	2414017N28	INDCTR, 220nH
L270	2414017N28	INDCTR, 220nH
L271	NOT PLACED	64AM DUMMY PART NUMBER
L272	2414017N28	INDCTR, 220nH
L276	2414017N17	INDCTR, 27nH
L281	2414017N17	INDCTR, 27nH
L282	2414017N14	INDCTR, 15nH

Circuit Ref	Motorola Part No.	Description
L283	NOT PLACED	64AM DUMMY PART NUMBER
L291	2414017N10	INDCTR, 6.8nH
L292	2414017N14	INDCTR, 15nH
L471	2414017K30	INDCTR, 390nH
M140	0286427Z02	ANTENNA NUT
Q21	4802247J01	RF AMP, BFS505
Q22	4815267H01	TRANSISTOR, PNP
Q51	4802197J95	TRANSISTOR, PBR941
Q70	4813973M07	TRANSISTOR, NPN
Q100	4885593U03	TRANSISTOR, NPN
Q150	4813973M07	TRANSISTOR, NPN
Q170	4809939C34	TRANSISTOR, PNP
Q171	4813973A42	TRANSISTOR, NPN
Q280	4802245J95	TRANSISTOR, NPN
Q311	4815069H02	TRANSISTOR, NPN
Q312	4815069H02	TRANSISTOR, NPN
Q313	4815066H01	TRANSISTOR, DIGITAL
Q402	4813973A42	TRANSISTOR, NPN
Q403	4813973A13	TRANSISTOR, PNP
Q410	4815066H01	TRANSISTOR, DIGITAL
Q425	4815069H02	TRANSISTOR, NPN
Q426	4815069H02	TRANSISTOR, NPN
Q427	4815069H02	TRANSISTOR, NPN
Q440	4815154H01	TRANSISTOR, NPN
Q470	4815267H01	TRANSISTOR, PNP
Q471	4815066H01	TRANSISTOR, DIGITAL
Q472	4815267H01	TRANSISTOR, PNP
Q481	NOT PLACED	64AM DUMMY PART NUMBER
Q482	NOT PLACED	64AM DUMMY PART NUMBER
Q490	4815066H01	TRANSISTOR, DIGITAL
Q493	4815069H02	TRANSISTOR, NPN
Q494	4815066H01	TRANSISTOR, DIGITAL
Q520	4815154H01	TRANSISTOR, NPN
R20	0613952Q91	RES, 5600
R21	0613952Q47	RES, 82
R22	0613952Q91	RES, 5600
R23	0613952R11	RES, 27K
R24	0613952Q73	RES, 1000
R25	0613952Q91	RES, 5600
R40	0613952Q73	RES, 1000
R51	0613952Q42	RES, 51
R52	0613952R03	RES, 12K
R53	0613952R13	RES, 33K
R54	0613952Q90	RES, 5100
R55	0613952Q61	RES, 330
R57	0613952Q89	RES, 4700
R60	0613952Q82	RES, 2400
R61	0613952R25	RES, 100K
R62	0613952Q85	RES, 3300
R63	0613952R15	RES, 39K
R64	0613952R08	RES, 20K
R65	0613952R15	RES, 39K
R66	0613952R08	RES, 20K
R67	0613952R08	RES, 20K
R72	0613952Q63	RES, 390
R73	0613952Q79	RES, 1800
R74	0613952Q75	RES, 1200
R75	0613952R03	RES, 12K
R76	0613952Z55	RES, 12K
R77	0613952Z53	RES, 8.2K
R78	0613952Q69	RES, 680
R80	0613952Q90	RES, 5100
R81	0613952Q73	RES, 1000
R82	NOT PLACED	64AM DUMMY PART NUMBER
R90	0613952Q42	RES, 51
R91	0613952Q78	RES, 1600
R100	0613952Q71	RES, 820
R101	0613952Q19	RES, 5.6
R102	0613952Q71	RES, 820
R103	0613952Q84	RES, 3000
R104	0613952H31	RES, 18
R105	0613952Q83	RES, 2700
R106	0613952Q89	RES, 4700
R107	NOT PLACED	64AM DUMMY PART NUMBER
R110	0613952Q69	RES, 680
R111	0613952Q80	RES, 2000
R120	0613958H53	RES, 150
R121	0613958H53	RES, 150
R150	0680539Z01	RES, 0.1
R151	0613952H39	RES, 39
R152	0613952P01	RES, 100K
R153	0613952P01	RES, 100K
R154	0613952P01	RES, 100K
R155	0613952P01	RES, 100K
R156	0613952Q61	RES, 330
R157	0613952Q81	RES, 2200
R158	0613952Q77	RES, 1500
R162	0613952R01	RES, 10K
R202	0613952R29	RES, 150K
R205	0613952Q49	RES, 100
R206	NOT PLACED	64AM DUMMY PART NUMBER
R212	0613958J74	RES, 0
R220	0613952Q48	RES, 91
R221	0613952Q48	RES, 91
R223	0613952Q49	RES, 100
R227	NOT PLACED	64AM DUMMY PART NUMBER
R230	0613952R09	RES, 22K
R243	0613952Q71	RES, 820
R244	0613952Q42	RES, 51
R245	0613952Q77	RES, 1500
R246	0613952R25	RES, 100K
R247	0613952R17	RES, 47K
R253	0613952Q37	RES, 33
R254	0613952Q49	RES, 100
R255	0613952Z46	RES, 3.9K
R261	0613952R09	RES, 22K
R262	0613952Q93	RES, 6800
R263	0613952Q37	RES, 33
R264	0613952Q49	RES, 100
R271	0613952Q90	RES, 5100
R272	0613952Q91	RES, 5600
R273	0613952Q61	RES, 330
R274	0613952Q37	RES, 33
R275	0613952Q49	RES, 100
R276	0613952Q73	RES, 1000
R277	0613952G67	RES, 0
R280	0613952Q89	RES, 4700
R281	0613952Q95	RES, 8200
R282	0613952Q72	RES, 910
R283	0613952Q53	RES, 150
R284	0613952Q57	RES, 220
R285	0613952R66	RES, 0
R310	0613952R25	RES, 100K
R311	0613952R25	RES, 100K
R312	0613952R08	RES, 20K
R313	0613952R01	RES, 10K
R320	0613952Z80	RES, 330K
R321	0613952P30	RES, 200K
R322	0613952R25	RES, 100K
R400	NOT PLACED	64AM DUMMY PART NUMBER
R401	0613952R36	RES, 300K
R402	0613952R01	RES, 10K
R403	0613952R01	RES, 10K
R404	0613952R18	RES, 51K
R405	0613952R36	RES, 300K
R406	0613952R33	RES, 220K
R407	0613952R25	RES, 100K
R408	0613952R25	RES, 100K
R409	0613952Q73	RES, 1000
R410	0613952R01	RES, 10K
R411	0613952Q71	RES, 820
R412	0613952R25	RES, 100K
R413	0613952R25	RES, 100K
R414	0613952R13	RES, 33K
R415	0613952R13	RES, 33K
R416	0613952R08	RES, 20K
R417	0613952R01	RES, 10K
R418	0613952R25	RES, 100K
R419	0613952Q89	RES, 4700
R420	0613952P30	RES, 200K
R421	0613952P01	RES, 100K
R422	0613952R25	RES, 100K
R423	0613952R25	RES, 100K
R424	0613952P30	RES, 200K
R425	0613952P01	RES, 100K
R430	0613952R25	RES, 100K
R431	NOT PLACED	64AM DUMMY PART NUMBER
R432	0613952R66	RES, 0
R433	0613952R25	RES, 100K
R434	NOT PLACED	64AM DUMMY PART NUMBER
R440	0613952Q89	RES, 4700
R441	0613952Q89	RES, 4700
R442	0613952H57	RES, 220
R443	0613952H51	RES, 120
R445	0613952Q89	RES, 4700
R446	0613952R01	RES, 10K
R451	0613952R17	RES, 47K
R460	0613952R10	RES, 24K
R462	0613952R10	RES, 24K
R463	0613952R10	RES, 24K
R464	0613952R12	RES, 30K
R469	0613952Q25	RES, 10
R470	0613952Q81	RES, 2200
R471	0613952Q81	RES, 2200
R472	0613952Q69	RES, 680
R473	0613952Q69	RES, 680
R474	0613952H61	RES, 330
R475	0613952R31	RES, 180K
R476	0613952R25	RES, 100K
R477	0613952Q81	RES, 2200
R478	0613952Q81	RES, 2200
R479	0613952R25	RES, 100K
R480	0613952G67	RES, 0
R481	NOT PLACED	64AM DUMMY PART NUMBER
R482	NOT PLACED	64AM DUMMY PART NUMBER
R483	NOT PLACED	64AM DUMMY PART NUMBER
R484	NOT PLACED	64AM DUMMY PART NUMBER
R485	NOT PLACED	64AM DUMMY PART NUMBER

Circuit Ref	Motorola Part No.	Description
R486	NOT PLACED	64AM DUMMY PART NUMBER
R487	0613952R66	RES, 0
R488	0613952R37	RES, 330K
R489	NOT PLACED	64AM DUMMY PART NUMBER
R490	NOT PLACED	64AM DUMMY PART NUMBER
R491	0613952R66	RES, 0
R492	0613952R10	RES, 24K
R493	0613952R37	RES, 330K
R494	0613952Z80	RES, 330K
R495	0613952Q91	RES, 5600
R496	NOT PLACED	64AM DUMMY PART NUMBER
R497	NOT PLACED	64AM DUMMY PART NUMBER
R498	NOT PLACED	64AM DUMMY PART NUMBER
R499	NOT PLACED	64AM DUMMY PART NUMBER
R501	0613952Q49	RES, 100
R502	0613952Q49	RES, 100
R503	0613952Q49	RES, 100
R504	0613952Q49	RES, 100
R505	0613952Q49	RES, 100
R506	0613952Q49	RES, 100
R507	0613952Q49	RES, 100
R508	0613952R25	RES, 100K
R509	0613952R25	RES, 100K
R510	0613952R37	RES, 330K
R511	0613952R25	RES, 100K
R512	0613952R29	RES, 150K
R513	0613952R25	RES, 100K
R514	0613952R25	RES, 100K
R515	0613952R66	RES, 0
R516	NOT PLACED	64AM DUMMY PART NUMBER
R517	NOT PLACED	64AM DUMMY PART NUMBER
R518	0613952R33	RES, 220K
R519	0613952R25	RES, 100K
R520	0613952R25	RES, 100K
R521	NOT PLACED	64AM DUMMY PART NUMBER
R522	0613952R25	RES, 100K
R523	0613952R01	RES, 10K
S440	4080710Z34	SWITCH, 4 POS
	4080710Z25	SWITCH, 16 POS
S441	4070354A01	LIGHT TOUCH SWITCH
S442	4070354A01	LIGHT TOUCH SWITCH
S443	4070354A01	LIGHT TOUCH SWITCH
S444	1880619Z04	VOLUME KNOB
SH1	2686421Z02	SHIELD
SH40	2686419Z02	SHIELD
SH50	2686423Z02	SHIELD
SH52	2686424Z02	SHIELD
SH100	2686418Z02	SHIELD
SH200	2686424Z02	SHIELD
SH201	2686423Z02	SHIELD
SH250	2686425Z02	SHIELD
SH251	2686425Z02	SHIELD
SH253	2686422Z02	SHIELD
SH400	2686420Z03	SHIELD
SH401	2686420Z03	SHIELD
T41	2515121H01	BALUN, TRANSFORMER
T42	2515121H01	BALUN, TRANSFORMER
U51	5115281H01	FM IF IC, SA616
U52	5115070H01	L-MOS IC, TC7W04FU
U110	0186438Z06	PA ASSY
U150	5114005A01	OP AMP, LM2904DR2G
U151	2415954H01	INDCTR BEAD
U201*	5185177Y01	AT25016-0T2X LVFRACN IC
U251	5105750U56	VCO BUFFER IC
U310	5115746H01	VOLTAGE REGULATOR, 5V
U320	5115679H01	VOLTAGE REGULATOR
U330	5115745H01	VOLTAGE REGULATOR, 3V
U401*	5185143E03	MC68HC11FL0
U402*	5115033H01	EEPROM IC
U403	NOT PLACED	64AM DUMMY PART NUMBER
U404*	5115037H01	4M FLASH ROM IC
U425	5115697H01	OP AMP, LO PWR
U451	5115062H01	ASFIC_CMP TQFP48 IC
U480	NOT PLACED	64AM DUMMY PART NUMBER
U490	5116029H01	AUDIO AMPLIFIER
U510	5114005A01	OP AMP, LM2904DR2G
U511	4815066H01	TRANSISTOR, DIGITAL
VR110	4813977A59	DIODE, ZENER
VR301	4813977M29	DIODE, ZENER
VR302	4813977M29	DIODE, ZENER
VR471	4813977M14	DIODE, ZENER
VR472	4813977M05	DIODE, ZENER
VR473	4813977M29	DIODE, ZENER
VR474	4813977M29	DIODE, ZENER
VR475	4813977M24	DIODE, ZENER
Y51	4802245J84	XTAL 44.395MHZ
Y70	9186145B02	CDBCA455CX36-TC
Y201*	4880114R08	CRYSTAL, 16.8MHZ
Y202	NOT PLACED	64AM DUMMY PART NUMBER
	5480678Z01	LABEL BARCODE
	8416205H02	PC BOARD

* Motorola Depot Servicing only

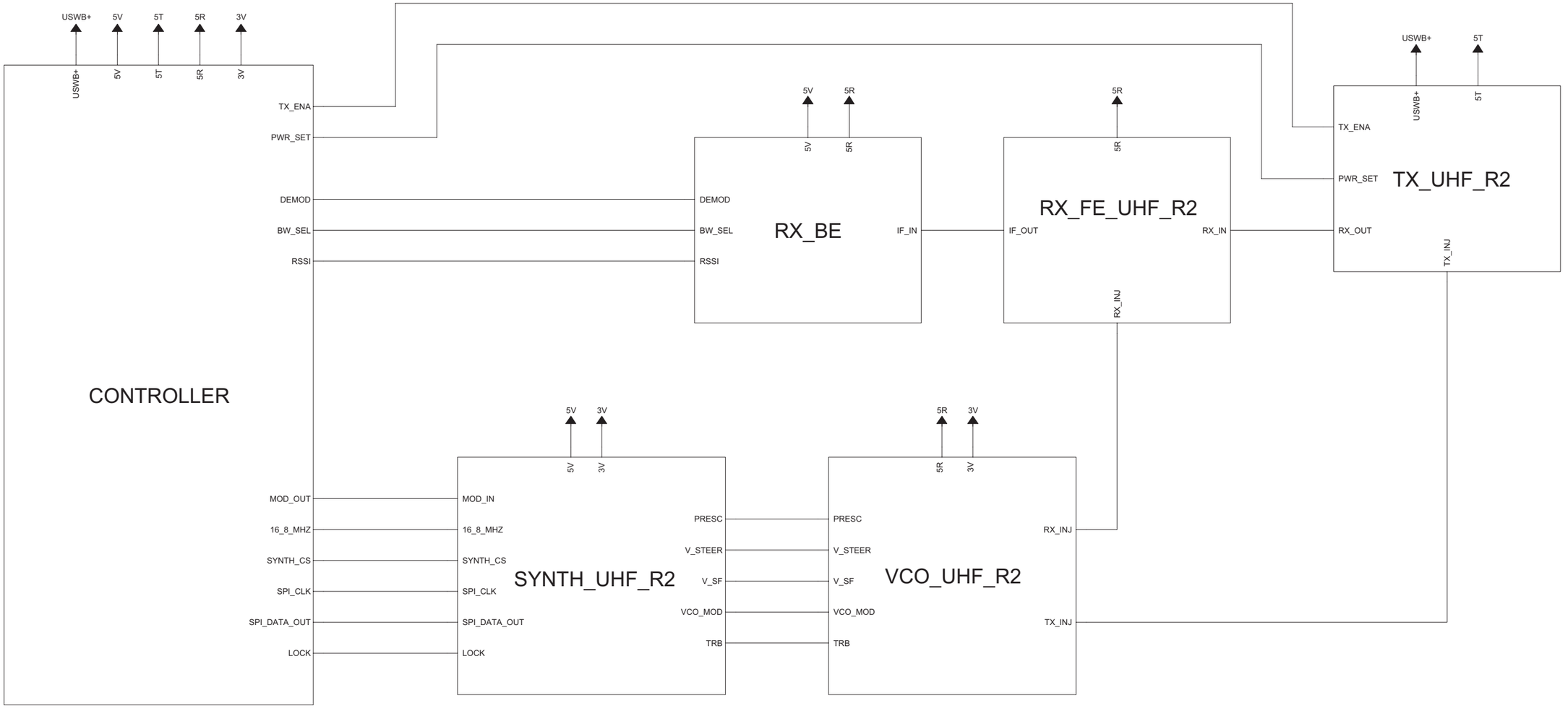


Figure 13-74. UHF (438–470 MHz) Radio Circuit Block Interconnect Diagram (8416205H04-F)

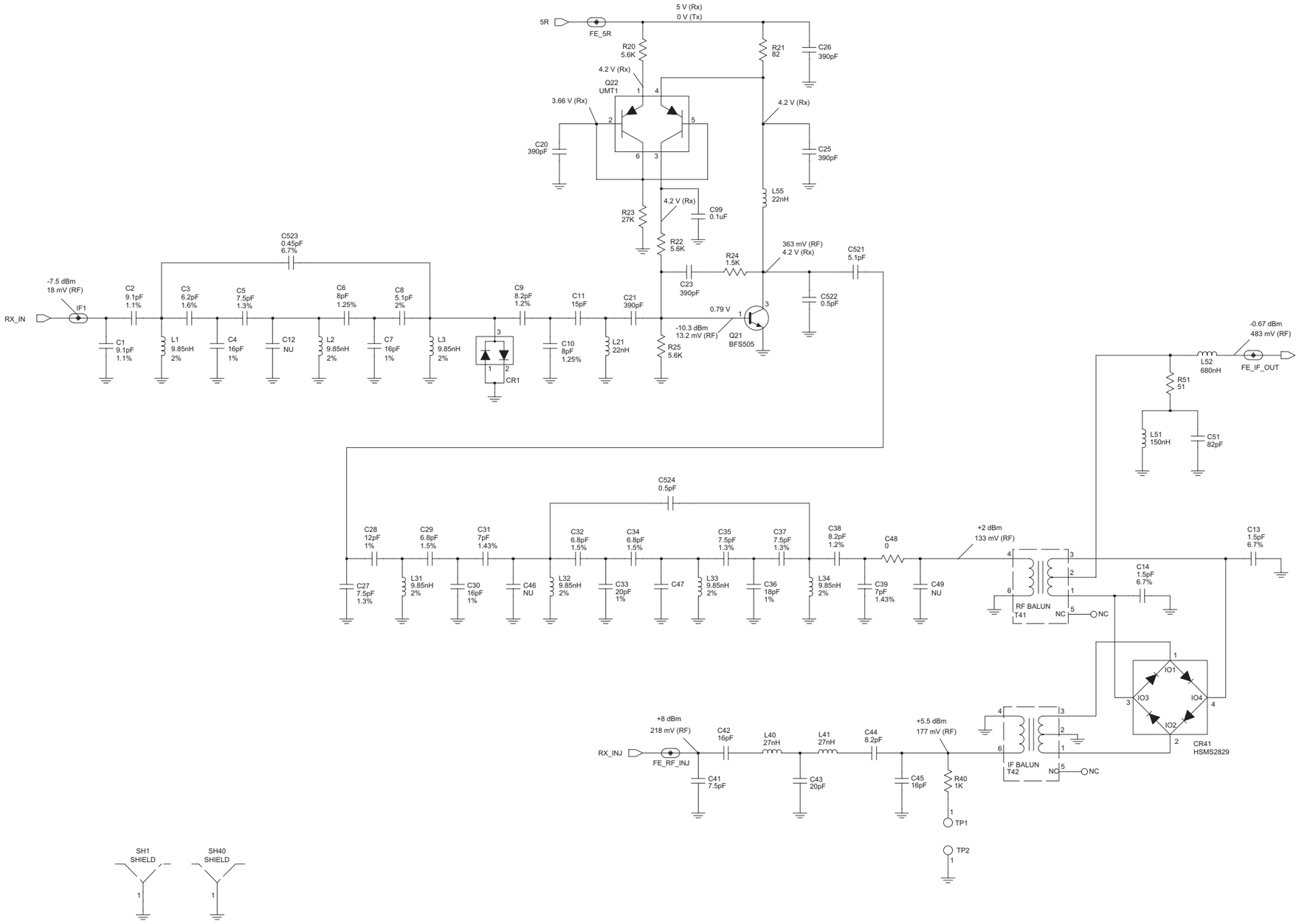


Figure 13-75. UHF (438–470 MHz) Receiver Front End Schematic Diagram (8416205H04-F)

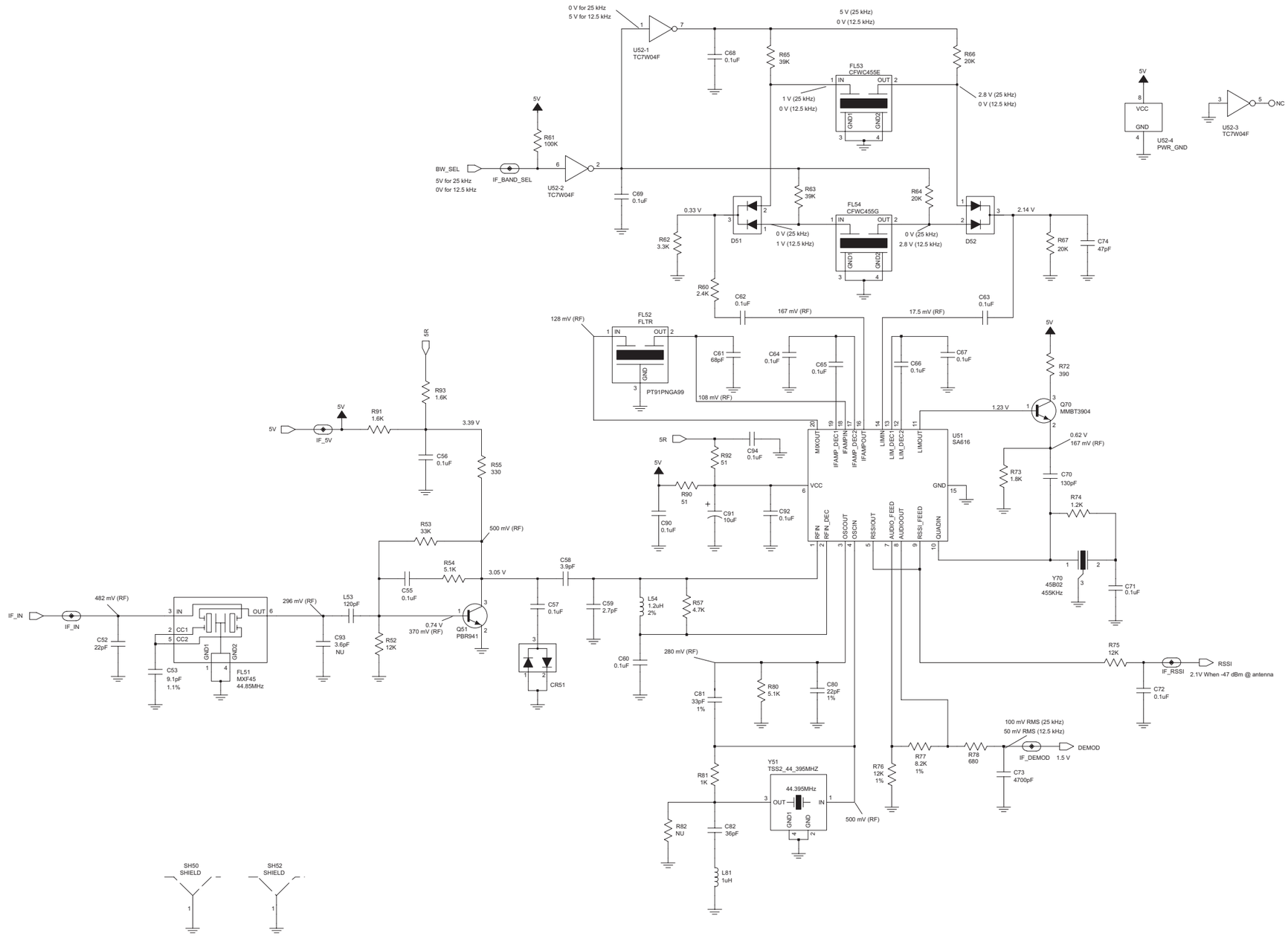
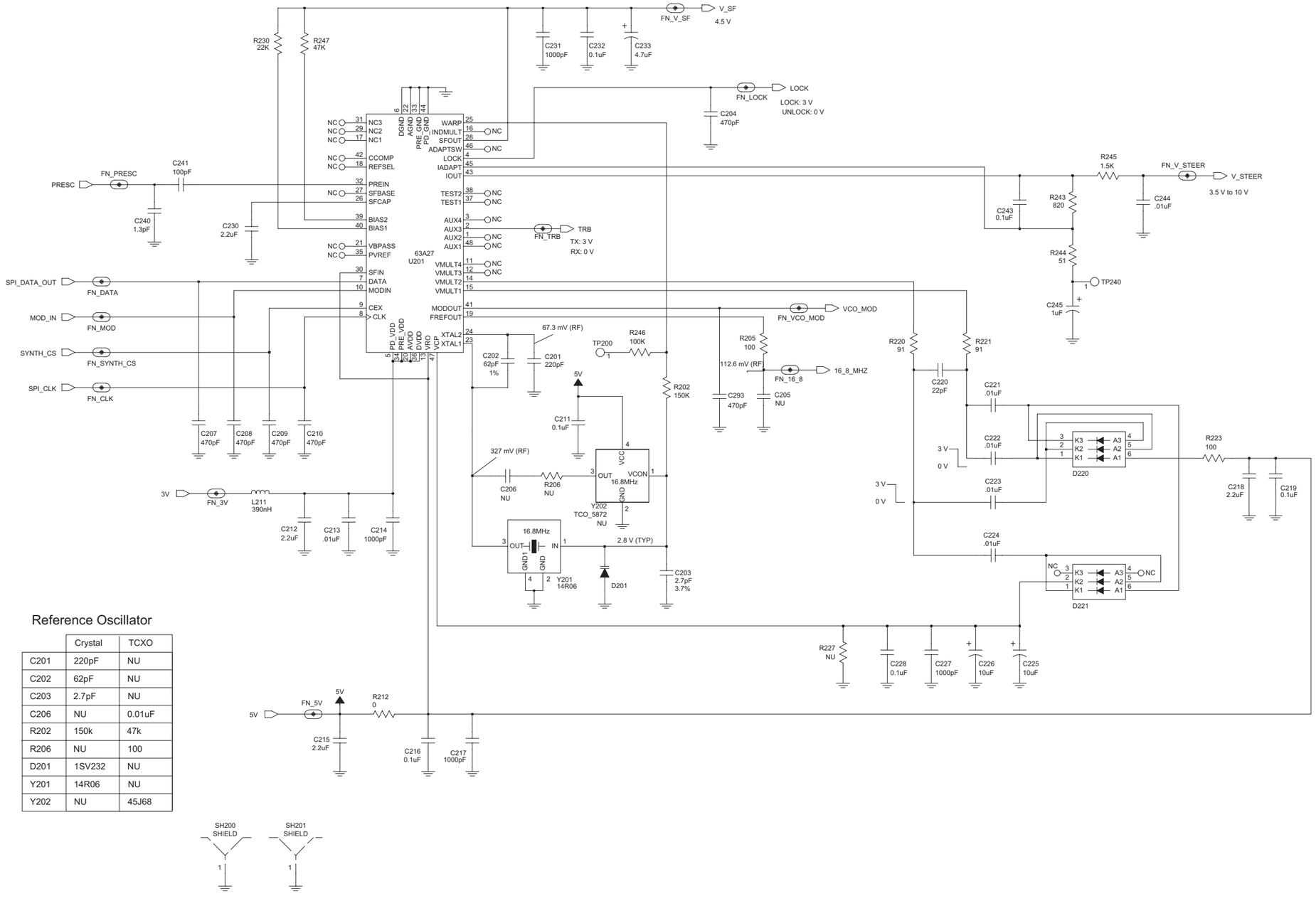


Figure 13-76. UHF (438–470 MHz) Receiver Back End Schematic Diagram (8416205H04-F)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 13-77. UHF (438–470 MHz) Synthesizer Schematic Diagram (8416205H04-F)

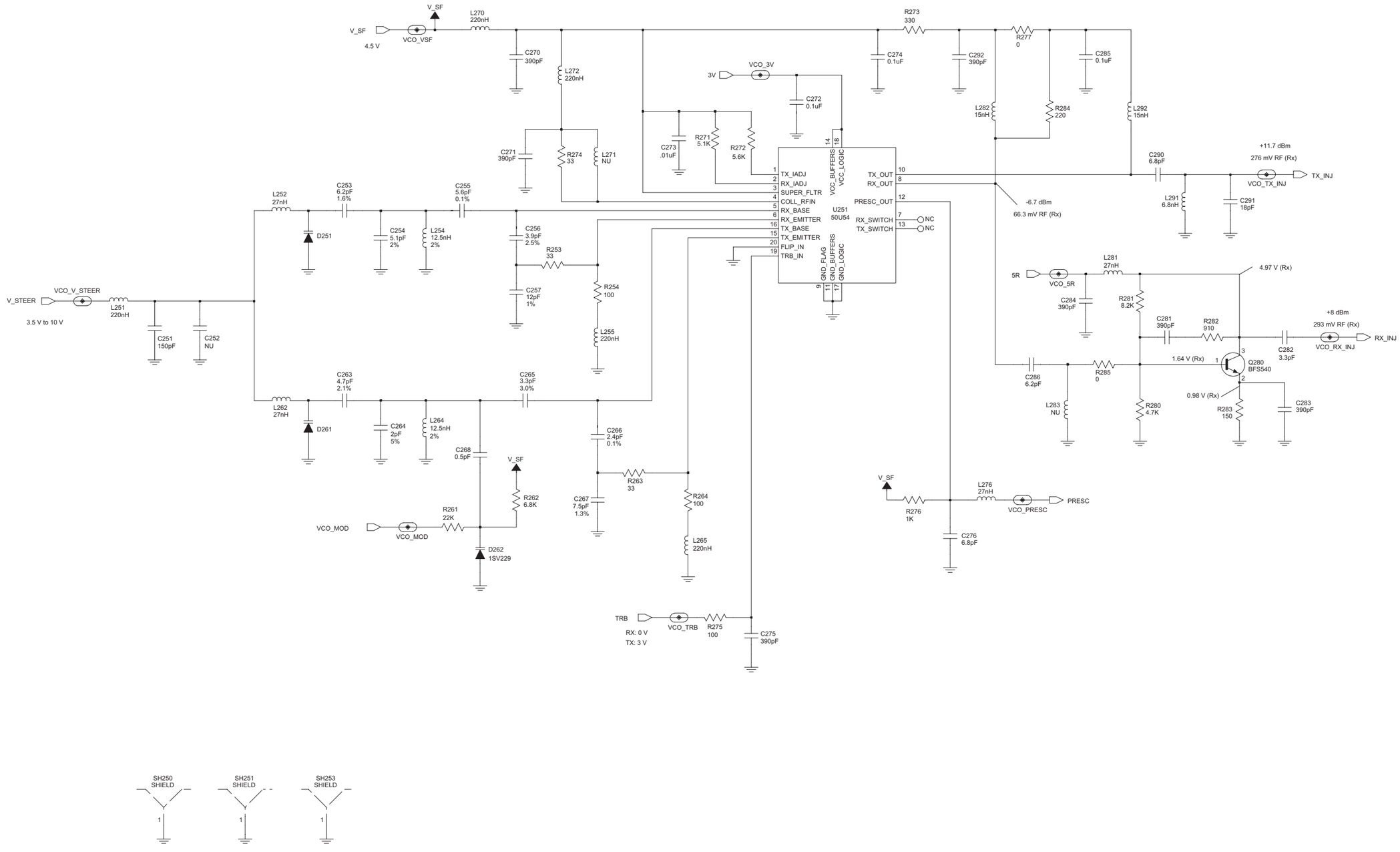


Figure 13-78. UHF (438–470 MHz) Voltage Controlled Oscillator Schematic Diagram (8416205H04-F)

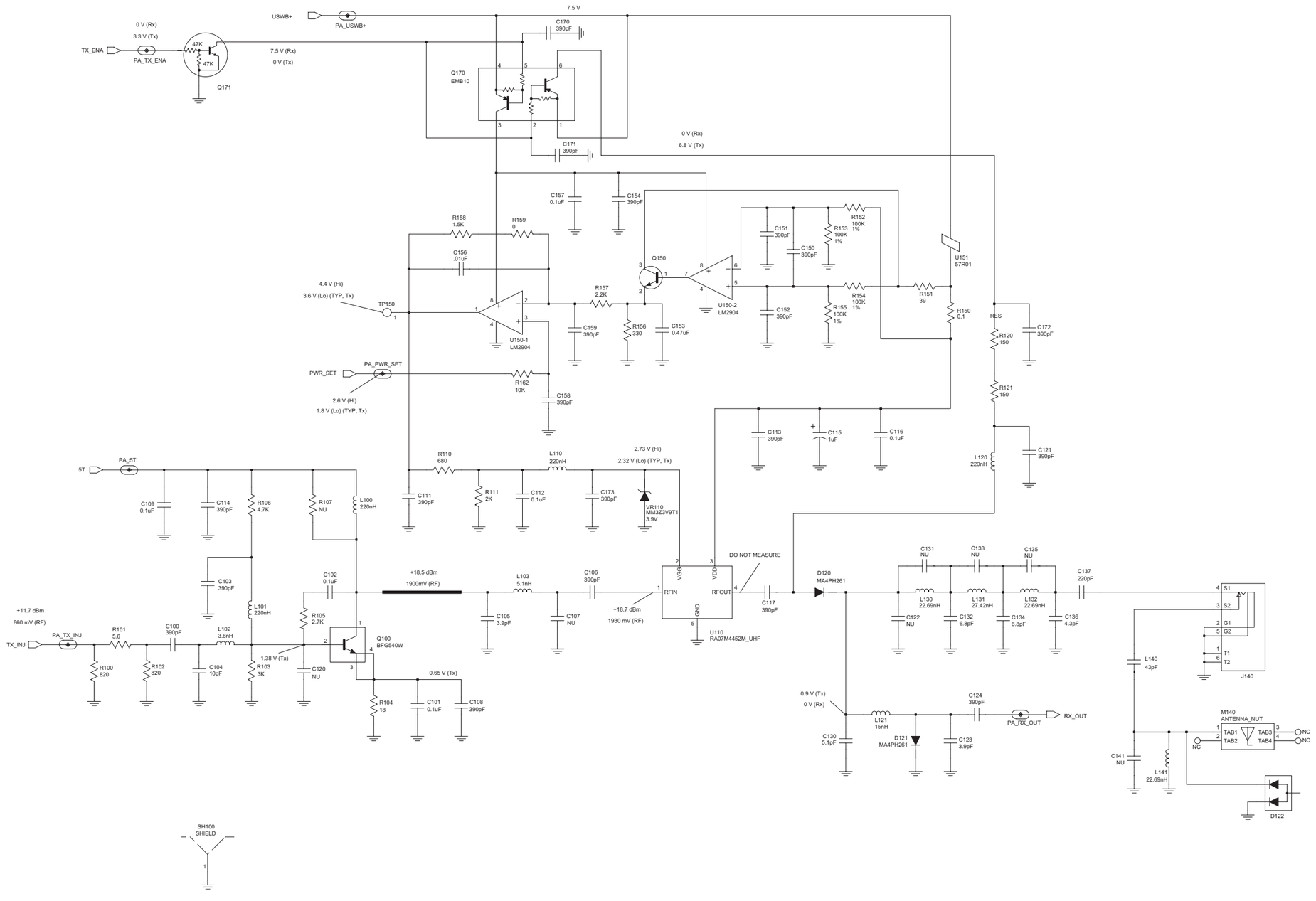


Figure 13-79. UHF (438–470 MHz) Transmitter and Power Control Schematic Diagram (8416205H04-F)

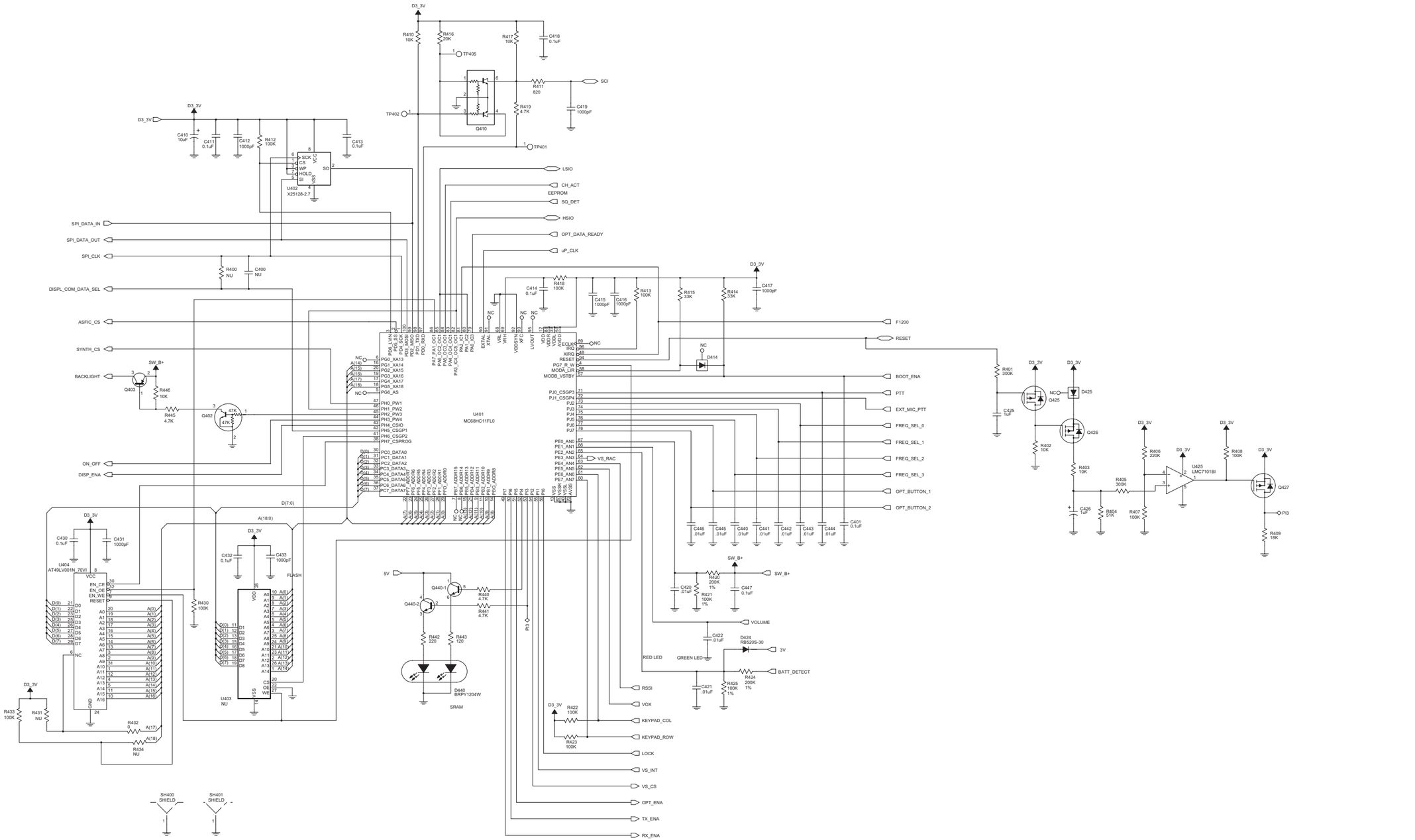


Figure 13-80. UHF (438–470 MHz) Microprocessor Circuitry Schematic Diagram (8416205H04-F)

	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

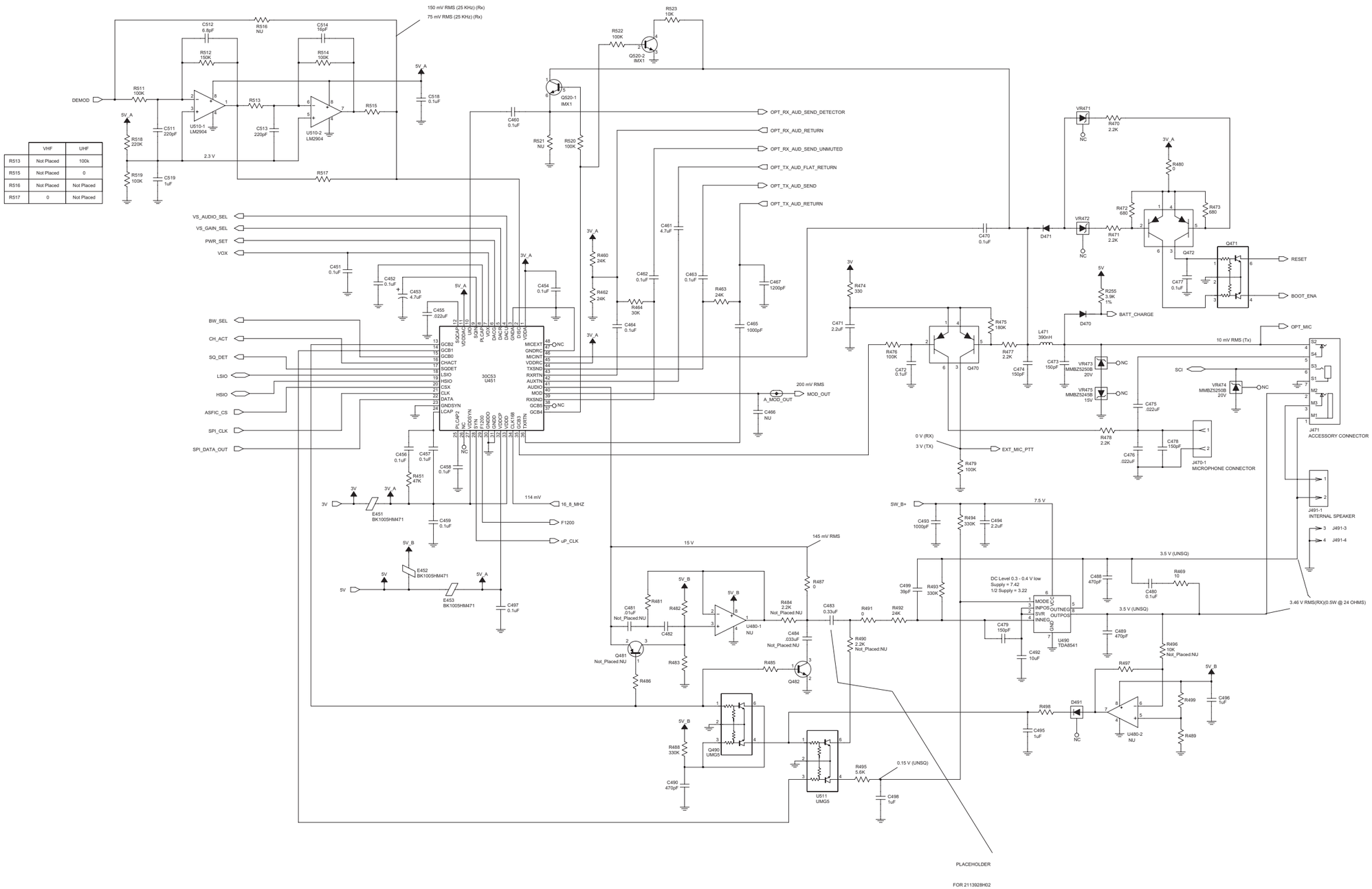


Figure 13-81. UHF (438–470 MHz) Audio Circuitry Schematic Diagram (8416205H04-F)

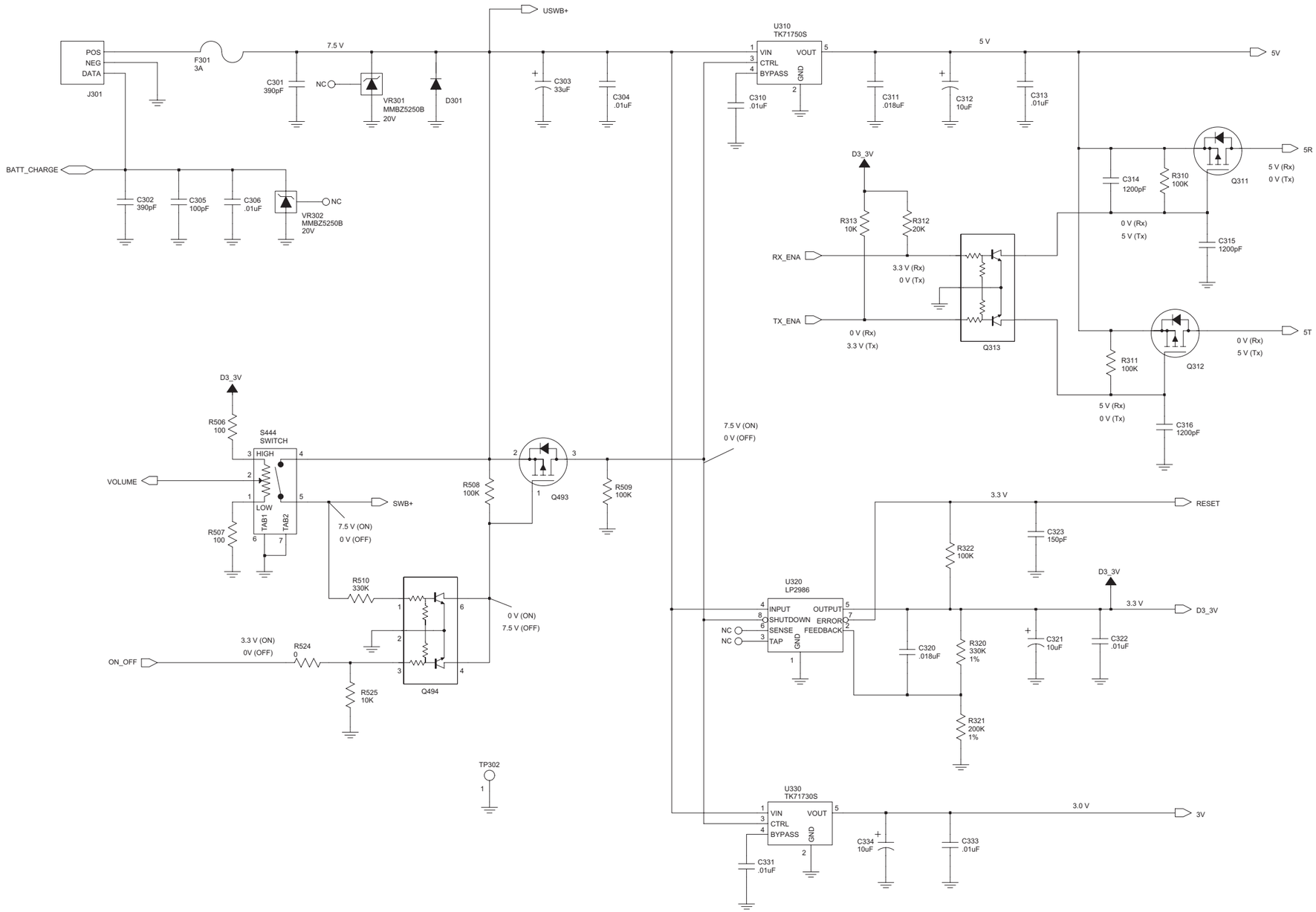


Figure 13-82. UHF (438–470 MHz) DC Regulation Schematic Diagram (8416205H04-F)

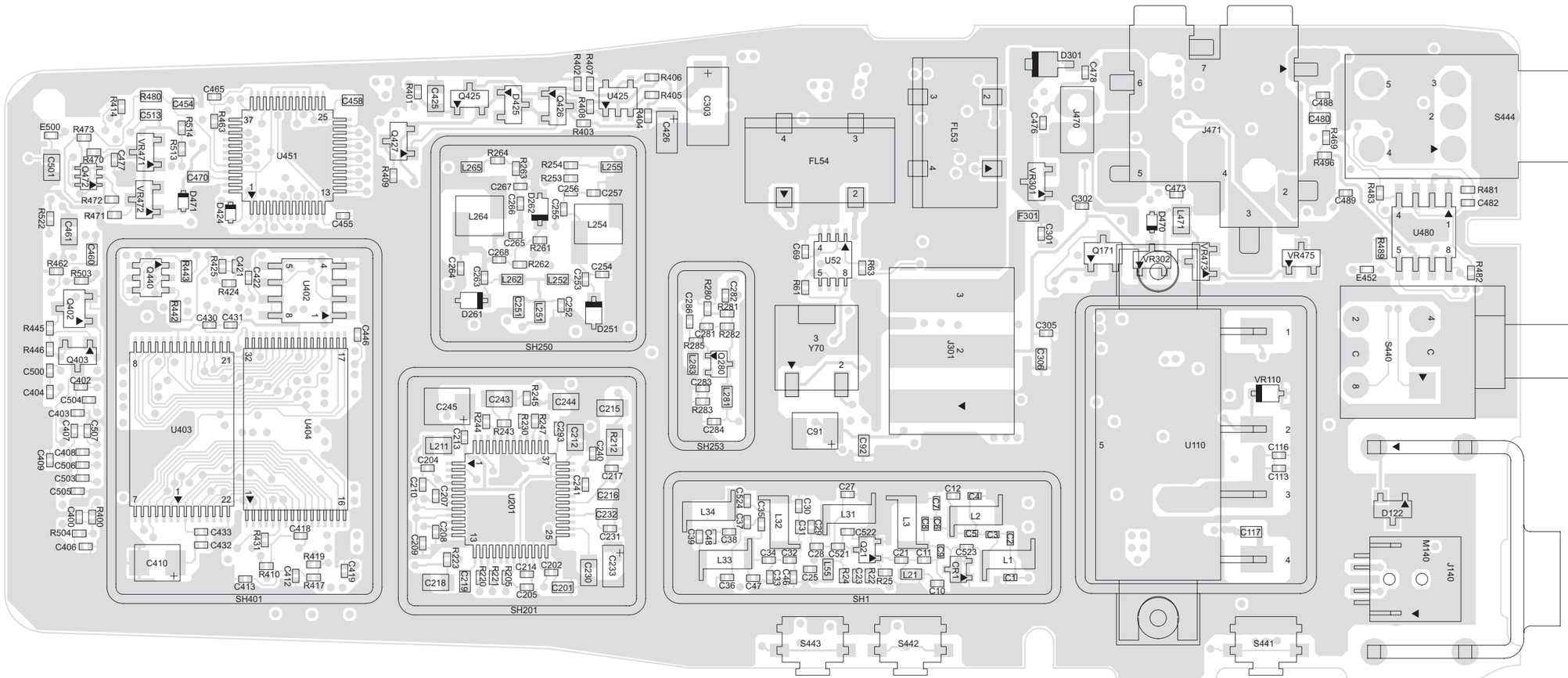


Figure 13-83. UHF (438–470 MHz) Board Component Side View (8416205H04-F)

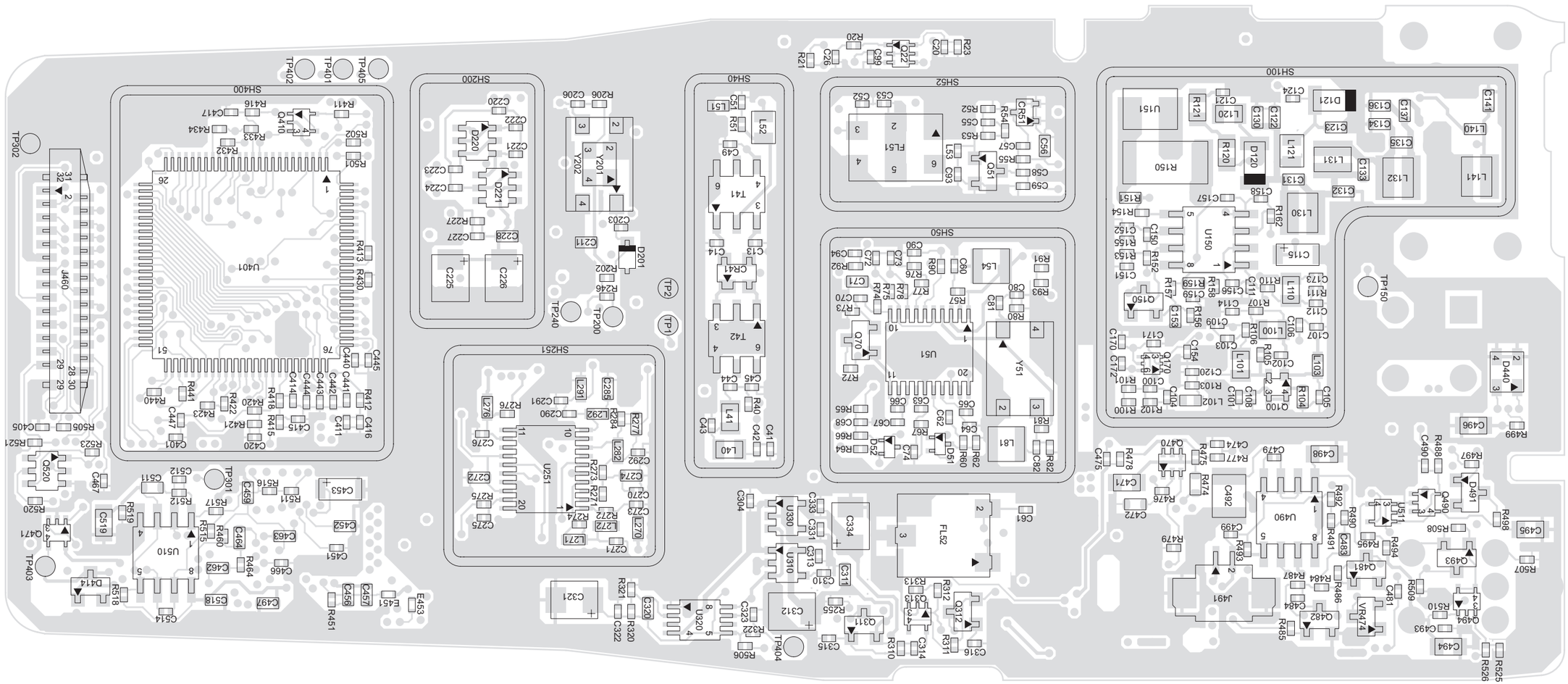


Figure 13-84. UHF (438–470 MHz) Board Solder Side View (8416205H04-F)

UHF (438–470 MHz) Radio Parts List (8416205H04-F)

Circuit Ref	Motorola Part No.	Description
C1	2115153H26	CAP, CERAMIC, COG
C2	2115153H26	CAP, CERAMIC, COG
C3	2115153H22	CAP, CERAMIC, COG
C4	2115153H38	CAP, CERAMIC, COG
C5	2115153H24	CAP, CERAMIC, COG
C6	2115153H32	CAP, CERAMIC, COG
C7	2115153H38	CAP, CERAMIC, COG
C8	2115153H20	CAP, CERAMIC, COG
C9	2115153H25	CAP, CERAMIC, COG
C10	2115153H32	CAP, CERAMIC, COG
C11	2113944A27	CAP CER CHP 15.0PF 50V 5%
C12	NOT PLACED	64AM DUMMY PART NUMBER
C13	2115153H07	CAP, CERAMIC, COG
C14	2115153H07	CAP, CERAMIC, COG
C20	2113945A04	CAP CER CHP 390PF 50V 10%
C21	2113945A04	CAP CER CHP 390PF 50V 10%
C23	2113945A04	CAP CER CHP 390PF 50V 10%
C25	2113945A04	CAP CER CHP 390PF 50V 10%
C26	2113945A04	CAP CER CHP 390PF 50V 10%
C27	2115153H26	CAP, CERAMIC, COG
C28	2115153H35	CAP, CERAMIC, COG
C29	2115153H23	CAP, CERAMIC, COG
C30	2115153H38	CAP, CERAMIC, COG
C31	2115153H31	CAP, CERAMIC, COG
C32	2115153H23	CAP, CERAMIC, COG
C33	2115153H40	CAP, CERAMIC, COG
C34	2115153H23	CAP, CERAMIC, COG
C35	2115153H24	CAP, CERAMIC, COG
C36	2115153H39	CAP, CERAMIC, COG
C37	2115153H24	CAP, CERAMIC, COG
C38	2115153H25	CAP, CERAMIC, COG
C39	2115153H31	CAP, CERAMIC, COG
C41	2113944A22	CAP CER CHP 7.5PF 50V +/- 0.5PF
C42	2113944A79	CAP,FXD,16PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C43	2113944A80	CAP,FXD,20PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C44	2113944A23	CAP CER CHP 8.2PF 50V +/- 0.5PF
C45	2113944A79	CAP,FXD,16PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C46	NOT PLACED	64AM DUMMY PART NUMBER
C47	NOT PLACED	64AM DUMMY PART NUMBER
C48	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
C49	NOT PLACED	64AM DUMMY PART NUMBER
C51	2113944A38	CAP CER CHP 82.0PF 50V 5%
C52	2115153H41	CAP,CERAMIC CHIP,22PF, +1%,-1%,50V-
C53	2115153H26	CAP, CERAMIC, COG
C55	2113946K02	CAP CER CHP 0.10UF 16V
C56	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C57	2113946K02	CAP CER CHP 0.10UF 16V
C58	2113944A15	CAP CER CHP 3.9PF 50V +/- 0.25PF
C59	2113944A11	CAP CER CHP 2.7PF 50V +/- 0.25PF
C60	2113946K02	CAP CER CHP 0.10UF 16V
C61	2113944A36	CAP CER CHP 68.0PF 50V 5%
C62	2113946K02	CAP CER CHP 0.10UF 16V
C63	2113946K02	CAP CER CHP 0.10UF 16V
C64	2113946K02	CAP CER CHP 0.10UF 16V
C65	2113946K02	CAP CER CHP 0.10UF 16V
C66	2113946K02	CAP CER CHP 0.10UF 16V
C67	2113946K02	CAP CER CHP 0.10UF 16V
C68	2113946K02	CAP CER CHP 0.10UF 16V
C69	2113946K02	CAP CER CHP 0.10UF 16V
C70	2113944A87	CAP,FXD,130PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,P
C71	2113945C31	CAP,FXD,.1UF, +10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C72	2113946K02	CAP CER CHP 0.10UF 16V
C73	2113945A13	CAP CER CHP 4700PF 50V 10%
C74	2113944A33	CAP CER CHP 47.0PF 50V 5%
C80	2115153H41	CAP,CERAMIC CHIP,22PF, +1%,-1%,50V-
C81	2115153H45	CAP, CERAMIC, COG
C82	2115153H46	CAP, CERAMIC, COG
C90	2113946K02	CAP CER CHP 0.10UF 16V
C91	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C92	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C93	NOT PLACED	64AM DUMMY PART NUMBER
C94	NOT PLACED	64AM DUMMY PART NUMBER
C99	2113946K02	CAP CER CHP 0.10UF 16V
C100	2113945A04	CAP CER CHP 390PF 50V 10%
C101	2113946K02	CAP CER CHP 0.10UF 16V
C102	2113946K02	CAP CER CHP 0.10UF 16V
C103	2113945A04	CAP CER CHP 390PF 50V 10%
C104	2113944A25	CAP CER CHP 10.0PF 50V +/- 0.5PF
C105	2113944A15	CAP CER CHP 3.9PF 50V +/- 0.25PF
C106	2113945A04	CAP CER CHP 390PF 50V 10%
C107	NOT PLACED	64AM DUMMY PART NUMBER
C108	2113945A04	CAP CER CHP 390PF 50V 10%
C109	2113946K02	CAP CER CHP 0.10UF 16V
C111	2113945A04	CAP CER CHP 390PF 50V 10%
C112	2113946K02	CAP CER CHP 0.10UF 16V
C113	2113945A04	CAP CER CHP 390PF 50V 10%
C114	2113945A04	CAP CER CHP 390PF 50V 10%
C115	2313960B01	CAP,FXD,1UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,87MA,E
C116	2113946K02	CAP CER CHP 0.10UF 16V
C117	2113944C05	CAP CER CHP 390.0PF 50V 5%
C120	NOT PLACED	64AM DUMMY PART NUMBER
C121	2113945A04	CAP CER CHP 390PF 50V 10%
C122	NOT PLACED	64AM DUMMY PART NUMBER
C123	2113944C20	CAP CER CHP 3.9PF 50V +/- 0.25PF
C124	2113945A04	CAP CER CHP 390PF 50V 10%
C130	2113944C70	CAP,FXD,5.1PF,.25PF+/-, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX
C131	NOT PLACED	64AM DUMMY PART NUMBER
C132	2113944C73	CAP,FXD,6.8PF,.25PF+/-, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX
C133	NOT PLACED	64AM DUMMY PART NUMBER
C134	2113944C73	CAP,FXD,6.8PF,.25PF+/-, 50V-DC,0603,C0G,-55DEG CMIN,125DEG CMAX
C135	NOT PLACED	64AM DUMMY PART NUMBER
C136	2113944C21	CAP CER CHP 4.3PF 50V +/- 0.25PF
C137	2113944C02	CAP CER CHP 220.0PF 50V 5%
C141	NOT PLACED	64AM DUMMY PART NUMBER
C150	2113945A04	CAP CER CHP 390PF 50V 10%
C151	2113945A04	CAP CER CHP 390PF 50V 10%
C152	2113945A04	CAP CER CHP 390PF 50V 10%
C153	2113946L04	CAP CER CHP 0.47UF 16V
C154	2113945A04	CAP CER CHP 390PF 50V 10%
C156	2113945B02	CAP CER CHP 10,000PF 25V 10%
C157	2113946K02	CAP CER CHP 0.10UF 16V
C158	2113945A04	CAP CER CHP 390PF 50V 10%
C159	2113945A04	CAP CER CHP 390PF 50V 10%
C170	2113945A04	CAP CER CHP 390PF 50V 10%
C171	2113945A04	CAP CER CHP 390PF 50V 10%
C172	2113945A04	CAP CER CHP 390PF 50V 10%
C173	2113945A04	CAP CER CHP 390PF 50V 10%
C201	2113944C02	CAP CER CHP 220.0PF 50V 5%
C202	2115153H52	CAP, CERAMIC, COG
C203	2115153H13	CAP, CERAMIC, COG

Circuit Ref	Motorola Part No.	Description
C204	2113945A05	CAP CER CHP 470PF 50V 10%
C205	NOT PLACED	64AM DUMMY PART NUMBER
C206	NOT PLACED	64AM DUMMY PART NUMBER
C207	2113945A05	CAP CER CHP 470PF 50V 10%
C208	2113945A05	CAP CER CHP 470PF 50V 10%
C209	2113945A05	CAP CER CHP 470PF 50V 10%
C210	2113945A05	CAP CER CHP 470PF 50V 10%
C211	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C212	2113946N03	CAP CER CHP 2.2UF 16V
C213	2113945B02	CAP CER CHP 10,000PF 25V 10%
C214	2113945A09	CAP CER CHP 1000PF 50V 10%
C215	2113946N03	CAP CER CHP 2.2UF 16V
C216	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C217	2113945A09	CAP CER CHP 1000PF 50V 10%
C218	2113946N03	CAP CER CHP 2.2UF 16V
C219	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C220	2113944A29	CAP CER CHP 22.0PF 50V 5%
C221	2113945B02	CAP CER CHP 10,000PF 25V 10%
C222	2113945B02	CAP CER CHP 10,000PF 25V 10%
C223	2113945B02	CAP CER CHP 10,000PF 25V 10%
C224	2113945B02	CAP CER CHP 10,000PF 25V 10%
C225	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C226	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C227	2113945A09	CAP CER CHP 1000PF 50V 10%
C228	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C230	2113946N03	CAP CER CHP 2.2UF 16V
C231	2113945A09	CAP CER CHP 1000PF 50V 10%
C232	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C233	2313960B30	CAP,FXD,4.7UF,+10%,-10%, 10V-DC,SM,-55DEG CMIN, 125DEG CMAX,122MA
C240	2113944A03	CAP CER CHP 1.3PF 50V +/- 0.25PF
C241	2113944A40	CAP CER CHP 100.0PF 50V 5%
C243	0886641Z01	CAP,FILM,.1UF,+20%,-20%, 16V-DC,12V-
C244	0888600M25	CAP MTL PPS FILM 10NF 50 3216
C245	2313960C26	CAP,FXD,1UF,+10%,-10%, 35V-DC,SM,-55DEG CMIN, 125DEG CMAX,114MA,E
C251	0888600M03	CAP
C252	NOT PLACED	64AM DUMMY PART NUMBER
C253	2115153H22	CAP, CERAMIC, COG
C254	2115153H20	CAP, CERAMIC, COG
C255	2115153H21	CAP, CERAMIC, COG
C256	2115153H17	CAP, CERAMIC, COG
C257	2115153H35	CAP, CERAMIC, COG
C263	2115153H19	CAP, CERAMIC, COG
C264	2115153H10	CAP, CERAMIC, COG
C265	2115153H15	CAP, CERAMIC, COG
C266	2115153H12	CAP, CERAMIC, COG
C267	2115153H24	CAP, CERAMIC, COG
C268	2115153H01	CAP, CERAMIC, COG
C270	2113945A04	CAP CER CHP 390PF 50V 10%
C271	2113945A04	CAP CER CHP 390PF 50V 10%
C272	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C273	2113945B02	CAP CER CHP 10,000PF 25V 10%
C274	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C275	2113945A04	CAP CER CHP 390PF 50V 10%
C276	2113944A21	CAP CER CHP 6.8PF 50V +/- 0.5PF
C281	2113945A04	CAP CER CHP 390PF 50V 10%
C282	2113944A13	CAP CER CHP 3.3PF 50V +/- 0.25PF
C283	2113945A04	CAP CER CHP 390PF 50V 10%
C284	2113945A04	CAP CER CHP 390PF 50V 10%
C285	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C286	2113944A20	CAP CER CHP 6.2PF 50V +/- 0.5PF
C290	2113944A21	CAP CER CHP 6.8PF 50V +/- 0.5PF
C291	2113944A28	CAP CER CHP 18.0PF 50V 5%
C292	2113945A04	CAP CER CHP 390PF 50V 10%
C293	2113945A05	CAP CER CHP 470PF 50V 10%
C301	2113945A04	CAP CER CHP 390PF 50V 10%
C302	2113945A04	CAP CER CHP 390PF 50V 10%
C303	2313960F04	CAP,FXD,33UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,303MA
C304	2113945B02	CAP CER CHP 10,000PF 25V 10%
C305	2113944A40	CAP CER CHP 100.0PF 50V 5%
C306	2113945L49	CAP,FXD,.01UF,+5%,-5%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX,P
C310	2113945B02	CAP CER CHP 10,000PF 25V 10%
C311	2113945C21	CAP,FXD,.018UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMA
C312	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C313	2113945B02	CAP CER CHP 10,000PF 25V 10%
C314	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C315	2113945A60	CAP,FXD,1200PF,+10%, -10%, 50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C316	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C320	2113945C21	CAP,FXD,.018UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMA
C321	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C322	2113945B02	CAP CER CHP 10,000PF 25V 10%
C323	2113944A42	CAP CER CHP 150.0PF 50V 5%
C331	2113945B02	CAP CER CHP 10,000PF 25V 10%
C333	2113945B02	CAP CER CHP 10,000PF 25V 10%
C334	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C400	NOT PLACED	64AM DUMMY PART NUMBER
C401	2113946K02	CAP CER CHP 0.10UF 16V
C402	2113945A09	CAP CER CHP 1000PF 50V 10%
C403	2113944A40	CAP CER CHP 100.0PF 50V 5%
C404	2113945A09	CAP CER CHP 1000PF 50V 10%
C405	2113944A40	CAP CER CHP 100.0PF 50V 5%
C406	2113944A40	CAP CER CHP 100.0PF 50V 5%
C407	2113945A09	CAP CER CHP 1000PF 50V 10%
C408	2113945A09	CAP CER CHP 1000PF 50V 10%
C409	2113945A09	CAP CER CHP 1000PF 50V 10%
C410	2313960D07	CAP,FXD,10UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,174MA
C411	2113946K02	CAP CER CHP 0.10UF 16V
C412	2113945A09	CAP CER CHP 1000PF 50V 10%
C413	2113946K02	CAP CER CHP 0.10UF 16V
C414	2113946K02	CAP CER CHP 0.10UF 16V

Circuit Ref	Motorola Part No.	Description
C415	2113945A09	CAP CER CHP 1000PF 50V 10%
C416	2113945A09	CAP CER CHP 1000PF 50V 10%
C417	2113945A09	CAP CER CHP 1000PF 50V 10%
C418	2113946K02	CAP CER CHP 0.10UF 16V
C419	2113945A09	CAP CER CHP 1000PF 50V 10%
C420	2113945B02	CAP CER CHP 10,000PF 25V 10%
C421	2113945B02	CAP CER CHP 10,000PF 25V 10%
C422	2113945B02	CAP CER CHP 10,000PF 25V 10%
C425	2113946E02	CAP CER CHP 1.0UF 16V 10%
C426	2313960B01	CAP,FXD,1UF,+10%,-10%, 16V-DC,SM,-55DEG CMIN, 125DEG CMAX,87MA,E
C430	2113946K02	CAP CER CHP 0.10UF 16V
C431	2113945A09	CAP CER CHP 1000PF 50V 10%
C432	2113946K02	CAP CER CHP 0.10UF 16V
C433	2113945A09	CAP CER CHP 1000PF 50V 10%
C440	2113945B02	CAP CER CHP 10,000PF 25V 10%
C441	2113945B02	CAP CER CHP 10,000PF 25V 10%
C442	2113945B02	CAP CER CHP 10,000PF 25V 10%
C443	2113945B02	CAP CER CHP 10,000PF 25V 10%
C444	2113945B02	CAP CER CHP 10,000PF 25V 10%
C445	2113945B02	CAP CER CHP 10,000PF 25V 10%
C446	2113945B02	CAP CER CHP 10,000PF 25V 10%
C447	2113946K02	CAP CER CHP 0.10UF 16V
C451	2113946K02	CAP CER CHP 0.10UF 16V
C452	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C453	2313960B30	CAP,FXD,4.7UF,+10%,-10%, 10V-DC,SM,-55DEG CMIN, 125DEG CMAX,122MA
C454	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C455	2113945B04	CAP,FXD,.022UF,+10%, -10%,25V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C456	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C457	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C458	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C459	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C460	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C461	2113946F03	CAP CER CHP 4.7UF 6.3V 10%
C462	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C463	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C464	2113945C31	CAP, FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C465	2113945A09	CAP CER CHP 1000PF 50V 10%
C466	NOT PLACED	64AM DUMMY PART NUMBER
C467	2113945A60	CAP,FXD,1200PF,+10%, -10%,50V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C470	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C471	2113946N03	CAP CER CHP 2.2UF 16V
C472	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C473	2113944A42	CAP CER CHP 150.0PF 50V 5%
C474	2113944A42	CAP CER CHP 150.0PF 50V 5%
C475	2113945B04	CAP,FXD,.022UF,+10%, -10%,25V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C476	2113945B04	CAP,FXD,.022UF,+10%, -10%, 25V-DC,0402,X7R, -55DEG CMIN,125DEG CMA
C477	2113946K02	CAP CER CHP 0.10UF 16V
C478	2113944A42	CAP CER CHP 150.0PF 50V 5%
C479	2113944A42	CAP CER CHP 150.0PF 50V 5%
C480	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R, -55DEG CMIN,125DEG CMAX
C481	NOT PLACED	64AM DUMMY PART NUMBER
C482	NOT PLACED	64AM DUMMY PART NUMBER
C483	2113946C02	CAP CER CHP 0.22UF 10V 10%
C484	NOT PLACED	64AM DUMMY PART NUMBER
C488	2113945A05	CAP CER CHP 470PF 50V 10%
C489	2113945A05	CAP CER CHP 470PF 50V 10%
C490	2113945A05	CAP CER CHP 470PF 50V 10%
C492	2113955E37	CAP,FXD,10UF,+10%,-10%, 16V-DC,1210,X7R,-55DEG CMIN,125DEG CMAX
C493	2113945A09	CAP CER CHP 1000PF 50V 10%
C494	2113946N03	CAP CER CHP 2.2UF 16V
C495	2113946N02	CAP CER CHP 1.0UF 16V
C496	2113946N02	CAP CER CHP 1.0UF 16V
C497	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C498	2113946N02	CAP CER CHP 1.0UF 16V
C499	2113944A32	CAP CER CHP 39.0PF 50V 5%
C500	2113945A09	CAP CER CHP 1000PF 50V 10%
C501	2113946N02	CAP CER CHP 1.0UF 16V
C503	2113945A09	CAP CER CHP 1000PF 50V 10%
C504	2113945A09	CAP CER CHP 1000PF 50V 10%
C505	2113945A09	CAP CER CHP 1000PF 50V 10%
C506	2113945A09	CAP CER CHP 1000PF 50V 10%
C507	2113945A09	CAP CER CHP 1000PF 50V 10%
C511	2113944C02	CAP CER CHP 220.0PF 50V 5%
C512	2113944A21	CAP CER CHP 6.8PF 50V +/- 0.5PF
C513	2113944C02	CAP CER CHP 220.0PF 50V 5%
C514	2113944A79	CAP,FXD,16PF,+5%,-5%, 50V-DC,0402,C0G,-55DEG CMIN,125DEG CMAX,PB
C518	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
C519	2113946N02	CAP CER CHP 1.0UF 16V
C521	2115153H20	CAP, CERAMIC, COG
C522	2115153H01	CAP, CERAMIC, COG
C523	2186463Z02	CAP, NPO, 0.45 +/- 0.03 PF
C524	2186463Z03	CAP, NPO, 0.50 +/- 0.03 PF
CR1	4813974A19	DIODE ARRAY,MXR,SM, SOT-323,7V,.2W,SHTK,2, PB-FREE
CR41	4815923H01	SCHOTTKY DIODE-NEW LEADFREE
CR51	4813974A19	DIODE ARRAY,MXR,SM, SOT-323,7V,.2W,SHTK,2, PB-FREE
D51	4815047H01	BAND SWITCHIND DIODE,ROHM DAN
D52	4815047H01	BAND SWITCHIND DIODE,ROHM DAN
D120	4880973Z02	PIN DIODE
D121	4880973Z02	PIN DIODE
D122	4813978C06	DIODE ARRAY,SIGNL/SWG, BD2836,SM,SOT-23,100MA, 75V,.225W,SHTK,2,PB
D201	4815072H01	DIODE VARACTOR
D220	4815011H01	DIODE TRIPLE
D221	4815011H01	DIODE TRIPLE
D251	4885055Y01	DIODE VARACTOR PB-FREE
D261	4885055Y01	DIODE VARACTOR PB-FREE
D262	4885055Y01	DIODE VARACTOR PB-FREE
D301	4815713H01	DIODE SCHOTTKY 1A 20V PWRMITE
D414	4816064H01	SOT SMBD1022 RH29M19 LH PB-FREE

Circuit Ref	Motorola Part No.	Description
D424	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D425	4816064H01	SOT SMBD1022 RH29M19 LH PB-FREE
D440	4805729G49	DIODE RED/YEL
D470	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D471	4809924D29	DIODE, SCHOTTKY, LOW LEAKAGE,SC79, SMD, W18 COMPLIANT
D491	NOT PLACED	64AM DUMMY PART NUMBER
E451	2480640Z01	SURFACE MOUNT FERRITE BEAD
E452	2480640Z01	SURFACE MOUNT FERRITE BEAD
E453	2480640Z01	SURFACE MOUNT FERRITE BEAD
E500	2480640Z01	SURFACE MOUNT FERRITE BEAD
F301	6515076H01	FUSE CHIP SMT TR/1608FF 3A
FL51	9180022M11	XTAL FILTER 44.85MHZ
FL52	9180468V04	SMD455KHZ 4 ELEMENT CER FLTR
FL53	9115811H03	SMD455KHZ 6 ELEMENT
FL54	9115811H01	SMD455KHZ 6 ELEMENT
J140	0986428Z02	CONNECTOR, RF
J301	0986565Z02	CONNECTOR CONTACT BATTERY
J460	0986615Z02	CONN,ZIF,F,28CONT,,TIN,,,CBL
J470	0985818A02	CONNECTOR, MICROPHONE, 2-PIN
J471	0980683Z03	AUDIO JACK (MONO & STEREO)
J491	2815162H01	HEADER SMT HORZ MOUNT LEAD-FREE
L1	2415428H08	AIR WOUND INDUCTOR
L2	2415428H08	AIR WOUND INDUCTOR
L3	2415428H08	AIR WOUND INDUCTOR
L21	2414017N16	IDCTR,CHIP, 22NH, 5%, 600MA, .54OHM, CER, 12 Q, 1.3GHZ SRF, SM,0603
L31	2415428H08	AIR WOUND INDUCTOR
L32	2415428H08	AIR WOUND INDUCTOR
L33	2415428H08	AIR WOUND INDUCTOR
L34	2415428H08	AIR WOUND INDUCTOR
L40	2414017K16	IDCTR,CHIP,27NH,5%,300MA,.3OHM,CER,16 Q,1.1GHZ SRF,SM,0805,P
L41	2414017K16	IDCTR,CHIP,27NH,5%,300MA,.3OHM,CER,16 Q,1.1GHZ SRF,SM,0805,P
L51	2414017N26	IDCTR,CHIP,150NH,5%,200MA,2.4OHM,CER,11 Q, 550MHZ SRF,SM,0603
L52	2414017K32	IDCTR,CHIP,560NH,5%,50MA,5OHM,CER,11 Q,150MHZ SRF,SM,0805,PB
L53	2113944A41	CAP CER CHP 120.0PF 50V 5%
L54	2414015A25	IDCTR,FXD,1.2UH,2%,440MA,2OHM,CER,20 Q,200MHZ SRF,SM,1008,PB
L55	2414017N16	IDCTR,CHIP,22NH,5%,600MA,.54OHM,CER,12 Q,1.3GHZ SRF,SM,0603
L81	2414015A19	IDCTR,FXD,1UH,2%,460MA, 1.75OHM,CER,33 Q,290MHZ SRF,SM,1008,P
L100	2414017K27	IDCTR,CHIP,220NH,5%,200MA,1.2OHM,CER,16 Q, 300MHZ SRF,SM,0805
L101	2414017K27	IDCTR,CHIP,220NH,5%,200MA,1.2OHM,CER,16 Q, 300MHZ SRF,SM,0805
L102	2415429H04	CHIP INDUCTOR
L103	2415429H08	CHIP INDUCTOR
L110	2414017K27	IDCTR,CHIP,220NH,5%,200MA,1.2OHM,CER,16 Q, 300MHZ SRF,SM,0805
L120	2414017K27	IDCTR,CHIP,220NH,5%,200MA,1.2OHM,CER,16 Q, 300MHZ SRF,SM,0805
L121	2414032F24	IDCTR,WW,15NH,5%,600MA, .17OHM,CER,45 Q,2.5GHZ SRF,SM,PB-FRE
L130	2460591M27	COIL AIR WOUND INDUC 22.69
L131	2460591M32	COIL AIR WOUND INDUC 27.42
L132	2460591M27	COIL AIR WOUND INDUC 22.69
L140	2113944C84	CAP,FXD,43PF,+5%,-5%,50V-DC,0603,C0G,-55DEG CMIN, 125DEG CMAX,PB
L141	2479990M01	INDUCTOR,AIR WOUND, 30.54NH,AIR,SM,HIGH Q REELED SURFACE MOUNT AIR WOUND(GREEN COLOUR)
L211	2414017K30	IDCTR,CHIP,390NH,5%,150MA,1.8OHM,CER,11Q,200MHZSRF,SM,0805,P
L251	2414017N28	IDCTR,CHIP,220NH,5%,150MA,3OHM,CER,11 Q, 450MHZ SRF,SM,0603,P
L252	2414017N17	IDCTR,CHIP,27NH,5%,600MA,.62OHM,CER,12 Q,1.2GHZ SRF,SM,0603
L254	2415385H02	COIL SURFACE MOUNT AIR WOUND
L255	2414017N28	IDCTR,CHIP,220NH,5%,150MA,3OHM,CER,11 Q, 450MHZ SRF,SM,0603,P
L262	2414017N17	IDCTR,CHIP,27NH,5%,600MA,.62OHM,CER,12 Q,1.2GHZ SRF,SM,0603
L264	2415385H02	COIL SURFACE MOUNT AIR WOUND
L265	2414017N28	IDCTR,CHIP,220NH,5%,150MA,3OHM,CER,11 Q, 450MHZ SRF,SM,0603,P
L270	2414017N28	IDCTR,CHIP,220NH,5%,150MA,3OHM,CER,11 Q, 450MHZ SRF,SM,0603,P
L271	NOT PLACED	64AM DUMMY PART NUMBER
L272	2414017N28	IDCTR,CHIP,220NH,5%,150MA,3OHM,CER,11 Q, 450MHZ SRF,SM,0603,P
L276	2414017N17	IDCTR,CHIP,27NH,5%,600MA,.62OHM,CER,12 Q,1.2GHZ SRF,SM,0603
L281	2414017N17	IDCTR,CHIP,27NH,5%,600MA,.62OHM,CER,12 Q,1.2GHZ SRF,SM,0603
L282	2414017N14	IDCTR,CHIP,15NH,5%,600MA,.4OHM,CER,12 Q,1.8GHZ SRF,SM,0603,P
L283	NOT PLACED	64AM DUMMY PART NUMBER
L291	2414017N10	IDCTR,CHIP,6.8NH,5%,600MA,.22OHM,CER,10 Q,2.7GHZ SRF,SM,0603
L292	2414017N14	IDCTR,CHIP,15NH,5%,600MA,.4OHM,CER,12 Q,1.8GHZ SRF,SM,0603,P
L471	2414017K30	IDCTR,CHIP,390NH,5%,150MA,1.8OHM,CER,11Q,200MHZSRF,SM,0805,P
M140	0286427Z02	NUT, ANTENNA
PASTE	1085674C03	PASTE/NC-SMQ230
Q21	4802247J01	TSTR,RF SMALL SIGNAL,,NPN,,,,,SMT,1
Q22	4815267H01	DBRT UMT1NFTN
Q51	4802197J95	RF TRANSISTOR PBR941
Q70	4813973M07	XSTR,BIP GP SS, NPN, T3904, SM,SOT-23, SMT, 40V, .225W, 200MA,300MHZ
Q100	4885593U03	TSTR NPN 9GHZ BFG540W
Q150	4813973M07	XSTR,BIP GP SS,NPN, T3904,SM,SOT-23,SMT,40V, .225W,200MA,300MHZ
Q170	4809939C34	TSTR DUAL PNP EMB10T2R EMT6
Q171	4813973A42	XSTR,BIP GP SS,NPN,SM, SC-59,SMT,50V,.23W, 100MA,PB-FREE
Q280	4802245J95	BJT, NPN TRANSISTOR
Q311	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q312	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q313	4815066H01	UMG5N DIGITAL TRANSISTOR
Q402	4813973A42	XSTR,BIP GP SS,NPN, SM,SC-59,SMT,50V, .23W, 100MA,PB-FREE
Q403	4813973A13	XSTR,GEN PURPOSE SMALL SIG,PNP, MMBT3906L,TO-236,4, PB-FREE
Q410	4815066H01	UMG5N DIGITAL TRANSISTOR
Q425	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q426	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q427	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q440	4815154H01	DUAL TRANS NPN
Q470	4815267H01	DBRT UMT1NFTN
Q471	4815066H01	UMG5N DIGITAL TRANSISTOR
Q472	4815267H01	DBRT UMT1NFTN

Circuit Ref	Motorola Part No.	Description
Q481	NOT PLACED	64AM DUMMY PART NUMBER
Q482	NOT PLACED	64AM DUMMY PART NUMBER
Q490	4815066H01	UMG5N DIGITAL TRANSISTOR
Q493	4885316E25	TSTR MOSFET P-CHAN TP0101T
Q494	4815066H01	UMG5N DIGITAL TRANSISTOR
Q520	4815154H01	DUAL TRANS NPN
R20	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R21	0613952Q47	CER CHIP RES 82.0 OHM 5% 0402
R22	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R23	0613952R11	CER CHIP RES 27K OHM 5% 0402
R24	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R25	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R40	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R51	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R52	0613952R03	CER CHIP RES 12K OHM 5% 0402
R53	0613952R13	CER CHIP RES 33K OHM 5% 0402
R54	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R55	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R57	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R60	0613952Q82	CER CHIP RES 2400 OHM 5% 0402
R61	0613952R25	CER CHIP RES 100K OHM 5% 0402
R62	0613952Q85	CER CHIP RES 3300 OHM 5% 0402
R63	0613952R15	CER CHIP RES 39K OHM 5% 0402
R64	0613952R08	CER CHIP RES 20K OHM 5% 0402
R65	0613952R15	CER CHIP RES 39K OHM 5% 0402
R66	0613952R08	CER CHIP RES 20K OHM 5% 0402
R67	0613952R08	CER CHIP RES 20K OHM 5% 0402
R72	0613952Q63	CER CHIP RES 390 OHM 5% 0402
R73	0613952Q79	CER CHIP RES 1800 OHM 5% 0402
R74	0613952Q75	CER CHIP RES 1200 OHM 5% 0402
R75	0613952R03	CER CHIP RES 12K OHM 5% 0402
R76	0613952Z55	RES,MF,12KOHM,1%,.0625 W,SM,0402,200PPM/CEL, PB-FREE
R77	0613952Z53	RES,MF,8.2KOHM,1%,.0625 W,SM,0402,200PPM/CEL, PB-FREE
R78	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R80	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R81	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R82	NOT PLACED	64AM DUMMY PART NUMBER
R90	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R91	0613952Q78	CER CHIP RES 1600 OHM 5% 0402
R92	NOT PLACED	64AM DUMMY PART NUMBER
R93	NOT PLACED	64AM DUMMY PART NUMBER
R100	0613952Q71	CER CHIP RES 820 OHM 5% 0402
R101	0613952Q19	CER CHIP RES 5.6 OHM 5% 0402
R102	0613952Q71	CER CHIP RES 820 OHM 5% 0402
R103	0613952Q84	CER CHIP RES 3000 OHM 5% 0402
R104	0613952H31	CER CHIP RES 18.0 OHM 5% 0603
R105	0613952Q83	CER CHIP RES 2700 OHM 5% 0402
R106	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R107	NOT PLACED	64AM DUMMY PART NUMBER
R110	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R111	0613952Q80	CER CHIP RES 2000 OHM 5% 0402
R120	0613958H53	CER CHIP RES 150 OHM 5% 0805
R121	0613958H53	CER CHIP RES 150 OHM 5% 0805
R150	0615043C01	RES POWER METAL STRIP W18 COMPLIANT
R151	0613952H39	CER CHIP RES 39.0 OHM 5% 0603
R152	0613952P01	CER CHIP RES 100K OHM 1% 0402
R153	0613952P01	CER CHIP RES 100K OHM 1% 0402
R154	0613952P01	CER CHIP RES 100K OHM 1% 0402
R155	0613952P01	CER CHIP RES 100K OHM 1% 0402
R156	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R157	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R158	0613952Q77	CER CHIP RES 1500 OHM 5% 0402
R159	2113945C31	CAP,FXD,.1UF,+10%,-10%, 50V-DC,0603,X7R,-55DEG CMIN,125DEG CMAX
R162	0613952R01	CER CHIP RES 10K OHM 5% 0402
R202	0613952R29	CER CHIP RES 150K OHM 5% 0402
R205	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R206	NOT PLACED	64AM DUMMY PART NUMBER
R212	0613958J74	CER CHIP RES 0.0 OHM JMP 0805
R220	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R221	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R223	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R227	NOT PLACED	64AM DUMMY PART NUMBER
R230	0613952R09	CER CHIP RES 22K OHM 5% 0402
R243	0613952Q71	CER CHIP RES 820 OHM 5% 0402
R244	0613952Q42	CER CHIP RES 51.0 OHM 5% 0402
R245	0613952Q77	CER CHIP RES 1500 OHM 5% 0402
R246	0613952R25	CER CHIP RES 100K OHM 5% 0402
R247	0613952R17	CER CHIP RES 47K OHM 5% 0402
R253	0613952Q37	CER CHIP RES 33.0 OHM 5% 0402
R254	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R255	0613952Z46	RES,MF,3.9KOHM,1%,.0625 W,SM,0402,200PPM/CEL, PB-FREE
R261	0613952R09	CER CHIP RES 22K OHM 5% 0402
R262	0613952Q93	CER CHIP RES 6800 OHM 5% 0402
R263	0613952Q37	CER CHIP RES 33.0 OHM 5% 0402
R264	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R271	0613952Q90	CER CHIP RES 5100 OHM 5% 0402
R272	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R273	0613952Q61	CER CHIP RES 330 OHM 5% 0402
R274	0613952Q37	CER CHIP RES 33.0 OHM 5% 0402
R275	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R276	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R277	0613952G67	CER CHIP RES 0.0 +/-0.050 OHM
R280	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R281	0613952Q95	CER CHIP RES 8200 OHM 5% 0402
R282	0613952Q72	CER CHIP RES 910 OHM 5% 0402
R283	0613952Q53	CER CHIP RES 150 OHM 5% 0402
R284	0613952Q57	CER CHIP RES 220 OHM 5% 0402
R285	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R310	0613952R25	CER CHIP RES 100K OHM 5% 0402
R311	0613952R25	CER CHIP RES 100K OHM 5% 0402

Circuit Ref	Motorola Part No.	Description
R312	0613952R08	CER CHIP RES 20K OHM 5% 0402
R313	0613952R01	CER CHIP RES 10K OHM 5% 0402
R320	0613952Z80	RES,MF,330KOHM,1%,.0625 W,SM,0402,200PPM/CEL, PB-FREE
R321	0613952P30	CER CHIP RES 200K OHM 1% 0402
R322	0613952R25	CER CHIP RES 100K OHM 5% 0402
R400	NOT PLACED	64AM DUMMY PART NUMBER
R401	0613952R36	CER CHIP RES 300K OHM 5% 0402
R402	0613952R01	CER CHIP RES 10K OHM 5% 0402
R403	0613952R01	CER CHIP RES 10K OHM 5% 0402
R404	0613952R18	CER CHIP RES 51K OHM 5% 0402
R405	0613952R36	CER CHIP RES 300K OHM 5% 0402
R406	0613952R33	CER CHIP RES 220K OHM 5% 0402
R407	0613952R25	CER CHIP RES 100K OHM 5% 0402
R408	0613952R25	CER CHIP RES 100K OHM 5% 0402
R409	0613952Q73	CER CHIP RES 1000 OHM 5% 0402
R410	0613952R01	CER CHIP RES 10K OHM 5% 0402
R411	0613952Q71	CER CHIP RES 820 OHM 5% 0402
R412	0613952R25	CER CHIP RES 100K OHM 5% 0402
R413	0613952R25	CER CHIP RES 100K OHM 5% 0402
R414	0613952R13	CER CHIP RES 33K OHM 5% 0402
R415	0613952R13	CER CHIP RES 33K OHM 5% 0402
R416	0613952R08	CER CHIP RES 20K OHM 5% 0402
R417	0613952R01	CER CHIP RES 10K OHM 5% 0402
R418	0613952R25	CER CHIP RES 100K OHM 5% 0402
R419	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R420	0613952P30	CER CHIP RES 200K OHM 1 0402
R421	0613952P01	CER CHIP RES 100K OHM 1 0402
R422	0613952R25	CER CHIP RES 100K OHM 5% 0402
R423	0613952R25	CER CHIP RES 100K OHM 5% 0402
R424	0613952P30	CER CHIP RES 200K OHM 1% 0402
R425	0613952P01	CER CHIP RES 100K OHM 1% 0402
R430	0613952R25	CER CHIP RES 100K OHM 5% 0402
R431	NOT PLACED	64AM DUMMY PART NUMBER
R432	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R433	0613952R25	CER CHIP RES 100K OHM 5% 0402
R434	NOT PLACED	64AM DUMMY PART NUMBER
R440	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R441	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R442	0613952H57	CER CHIP RES 220 OHM 5% 0603
R443	0613952H51	CER CHIP RES 120 OHM 5% 0603
R445	0613952Q89	CER CHIP RES 4700 OHM 5% 0402
R446	0613952R01	CER CHIP RES 10K OHM 5% 0402
R451	0613952R17	CER CHIP RES 47K OHM 5% 0402
R460	0613952R10	CER CHIP RES 24K OHM 5% 0402
R462	0613952R10	CER CHIP RES 24K OHM 5% 0402
R463	0613952R10	CER CHIP RES 24K OHM 5% 0402
R464	0613952R12	CER CHIP RES 30K OHM 5% 0402
R469	0613952Q25	CER CHIP RES 10.0 OHM 5% 0402
R470	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R471	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R472	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R473	0613952Q69	CER CHIP RES 680 OHM 5% 0402
R474	0613952H61	CER CHIP RES 330 OHM 5% 0603
R475	0613952R31	CER CHIP RES 180K OHM 5% 0402
R476	0613952R25	CER CHIP RES 100K OHM 5% 0402
R477	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R478	0613952Q81	CER CHIP RES 2200 OHM 5% 0402
R479	0613952R25	CER CHIP RES 100K OHM 5% 0402
R480	0613952G67	CER CHIP RES 0.0 +/-0.050 OHM
R481	NOT PLACED	64AM DUMMY PART NUMBER
R482	NOT PLACED	64AM DUMMY PART NUMBER
R483	NOT PLACED	64AM DUMMY PART NUMBER
R484	NOT PLACED	64AM DUMMY PART NUMBER
R485	NOT PLACED	64AM DUMMY PART NUMBER
R486	NOT PLACED	64AM DUMMY PART NUMBER
R487	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R488	0613952R37	CER CHIP RES 330K OHM 5% 0402
R489	NOT PLACED	64AM DUMMY PART NUMBER
R490	NOT PLACED	64AM DUMMY PART NUMBER
R491	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R492	0613952R10	CER CHIP RES 24K OHM 5 0402
R493	0613952R37	CER CHIP RES 330K OHM 5% 0402
R494	0613952Z80	RES,MF,330KOHM,1%, .0625W,SM,0402, 200PPM/CEL,PB-FREE
R495	0613952Q91	CER CHIP RES 5600 OHM 5% 0402
R496	NOT PLACED	64AM DUMMY PART NUMBER
R497	NOT PLACED	64AM DUMMY PART NUMBER
R498	NOT PLACED	64AM DUMMY PART NUMBER
R499	NOT PLACED	64AM DUMMY PART NUMBER
R501	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R502	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R503	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R504	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R505	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R506	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R507	0613952Q49	CER CHIP RES 100 OHM 5% 0402
R508	0613952R25	CER CHIP RES 100K OHM 5% 0402
R509	0613952R25	CER CHIP RES 100K OHM 5% 0402
R510	0613952R37	CER CHIP RES 330K OHM 5% 0402
R511	0613952R25	CER CHIP RES 100K OHM 5% 0402
R512	0613952R29	CER CHIP RES 150K OHM 5% 0402
R513	0613952R25	CER CHIP RES 100K OHM 5% 0402
R514	0613952R25	CER CHIP RES 100K OHM 5% 0402
R515	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
R516	NOT PLACED	64AM DUMMY PART NUMBER
R517	NOT PLACED	64AM DUMMY PART NUMBER
R518	0613952R33	CER CHIP RES 220K OHM 5% 0402
R519	0613952R25	CER CHIP RES 100K OHM 5% 0402
R520	0613952R25	CER CHIP RES 100K OHM 5% 0402
R521	NOT PLACED	64AM DUMMY PART NUMBER
R522	0613952R25	CER CHIP RES 100K OHM 5% 0402

Circuit Ref	Motorola Part No.	Description
R523	0613952R01	CER CHIP RES 10K OHM 5% 0402
R525	0613952R01	CER CHIP RES 10K OHM 5% 0402
R526	0613952R66	CER CHIP RES 0.0 +/-0.050 OHM
S440	4080710Z26	SWITCH, FREQUENCY (EPP)
S441	4070354A01	LIGHT TOUCH SWITCH-SMD
S442	4070354A01	LIGHT TOUCH SWITCH-SMD
S443	4070354A01	LIGHT TOUCH SWITCH-SMD
S444	1880619Z06	POTENTIOMETER, VOLUME
SH1	2686421Z02	SHIELD, FE, ELP
SH40	2686419Z02	SHIELD, MIXER, ELP
SH50	2686423Z02	SHIELD, 19 X 19 X 3.03 MM
SH52	2686424Z02	SHIELD, IF, ELP
SH100	2686418Z03	SHEILD, HARMONIC FILTER, ELP
SH200	2686424Z02	SHIELD, IF, ELP
SH201	2686423Z02	SHIELD, 19 X 19 X 3.03 MM
SH250	2686425Z02	SHIELD
SH251	2686425Z02	SHIELD
SH253	2686422Z02	SHIELD, BUFFER, ELP
SH400	2686420Z04	SHIELD, CONTROL, ELP
SH401	2686420Z03	SHIELD,CONTROL,ELP
SP7	1088791Y02	SOLDER PELLETS, LEAD FREE
T41	2515121H01	BALUN, TRANSFORMER W18 COMP
T42	2515121H01	BALUN, TRANSFORMER W18 COMP
U51	5115281H01	FM IF IC SA616 FROM PHILIPS
U52	5115070H01	IC 3-INV LMOS TC7W04FU
U110	0186438Z06	ASSEMBLY, UHF PA MODULE
U150	5114005A01	IC,OP AMP,2PER PKG, GP,SM,SO-8,PB-FREE
U151	2415954H02	INDUCTOR BEAD CHIP EPP WITH EPOXY
U201	5185177Y01	IC TESTED AT25016 48 PIN W18
U251	5171121L01	CUSTOM LOW VOLTAGE VCO BUFFER IC
U310	5115746H01	VOLTAGE REGULATOR, 5V
U320	5115679H01	IC VOLTAGE REGLTR LP2986
U330	5115745H01	VOLTAGE REGULATOR, 3V
U401	5185143E03	HC11FL0 (3V) ASIC MICRO-P
U402	5116648H01	128KBIT SERIAL SPI BUS EEPROM
U403	NOT PLACED	64AM DUMMY PART NUMBER
U404	51012084002	IC FLASH 4MBIT 3.3V 8MM14MM
U425	5115697H01	LOW PWR OP AMP W/RAIL TO RAIL
U451	5115062H01	IC ASFIC_CMP
U480	NOT PLACED	64AM DUMMY PART NUMBER
U490	5116029H01	1 W BTL AUDIO AMPLIFIER
U510	5114005A01	IC,OP AMP,2PER PKG,GP, SM,SO-8,PB-FREE
U511	4815066H01	UMG5N DIGITAL TRANSISTOR
VR110	4813977A59	DIODE,ZEN,MM3Z3V9,SM,SOD-323,3.9V,10MA,.2W,ZEN, PB-FREE
VR301	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR302	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR471	4813977M14	DIODE,ZEN,MBZ5235,SM,SOT-23,6.8V,10MA,.225W, ZEN,PB-FREE
VR472	4813977M05	DIODE,ZEN,MBZ5226,SM, SOT-23,3.3V,10MA,.225W, ZEN,PB-FREE
VR473	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR474	4813977M29	DIODE,VREF,MBZ5250,SM, SOT-23,20V,.225W,ZEN
VR475	4813977M24	DIODE,ZEN,MBZ5245,SM, SOT-23,15V,10MA,.225W, ZEN,PB-FREE
Y51	4802245J84	XTAL 44.395MHZ, 3RD OT, SMD
Y70	9186145B02	CER.DISCR. CDBCA455CX36-TC
Y201	4880114R08	CRYSTAL, QUARTZ 16.8 MHZ
Y202	NOT PLACED	64AM DUMMY PART NUMBER

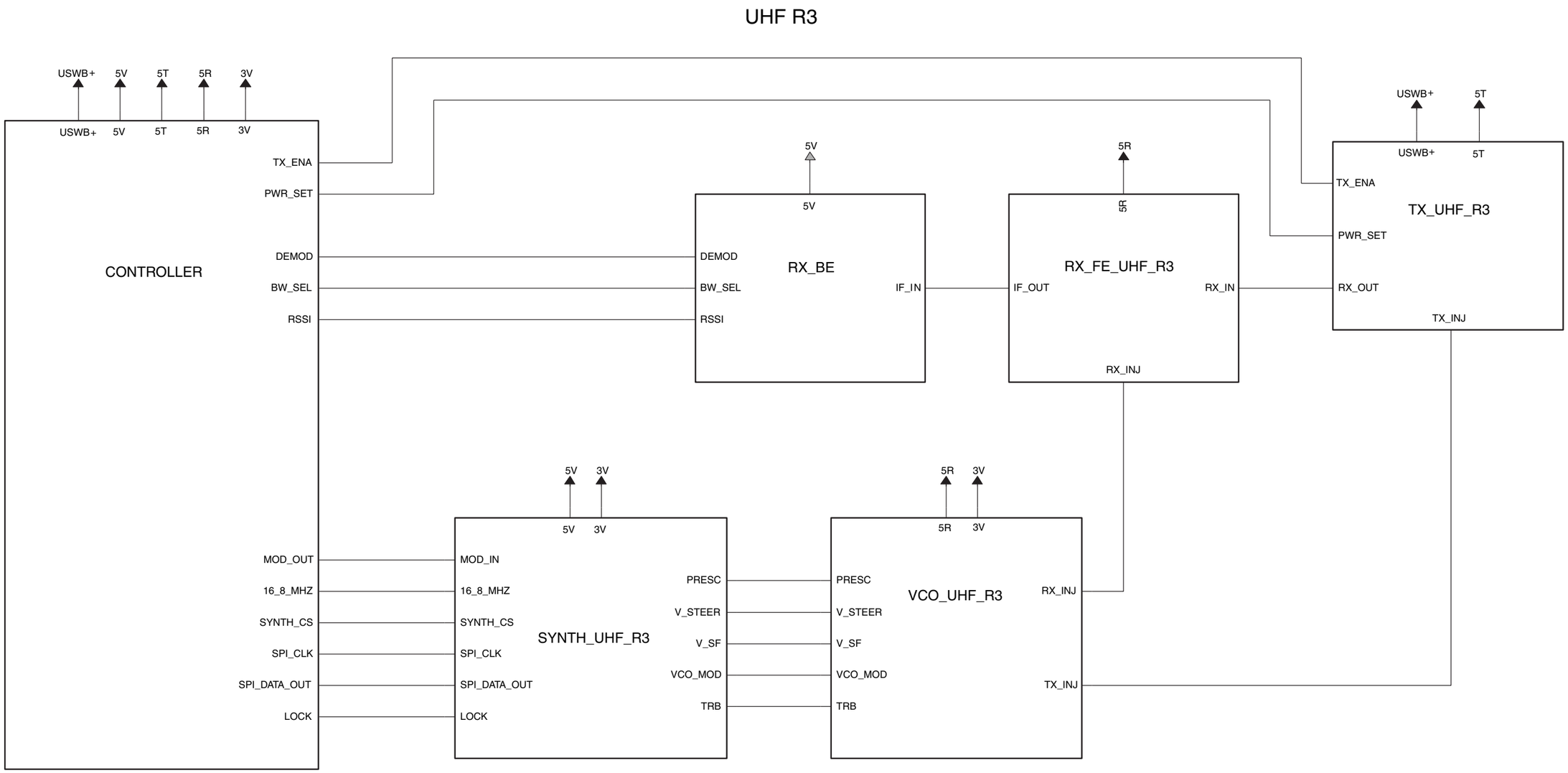


Figure 13-85. UHF (465–495 MHz) Radio Circuit Block Diagram (8486634Z02-O)

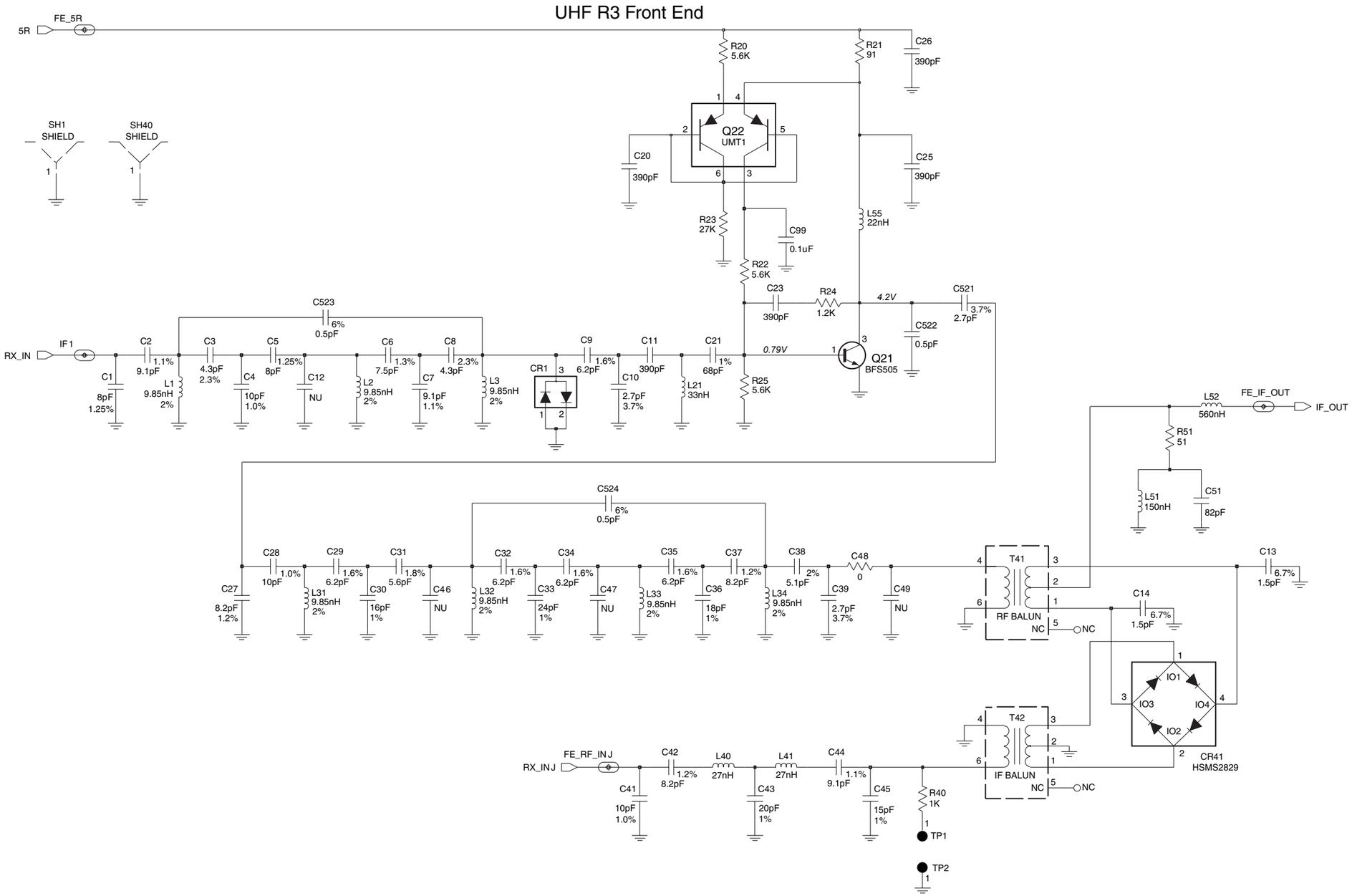


Figure 13-86. UHF (465–495 MHz) Receiver Front End Schematic Diagram (8486634Z02-O)

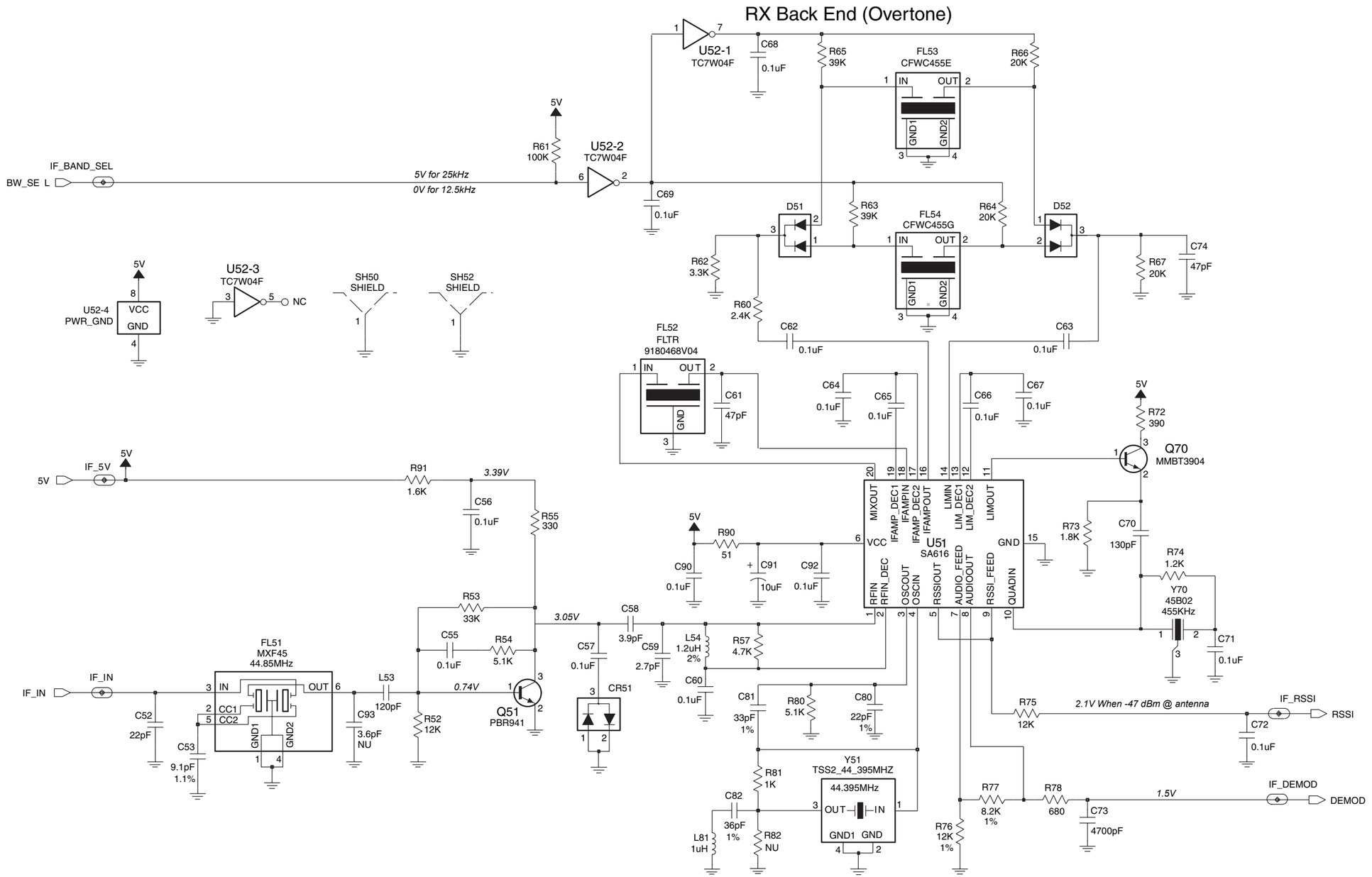
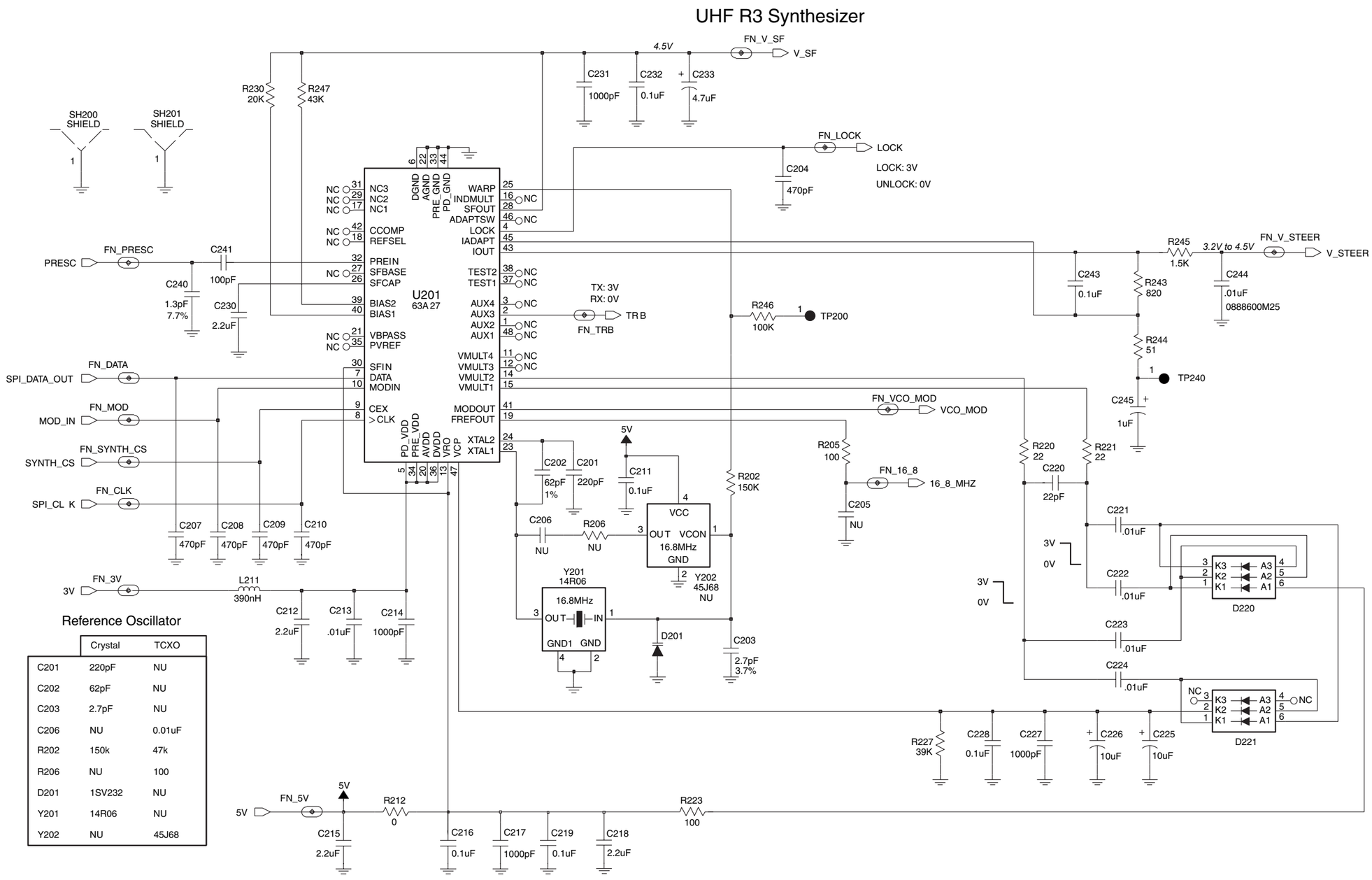


Figure 13-87. UHF (465–495 MHz) Receiver Back End Schematic Diagram (8486634Z02-O)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 13-88. UHF (465–495 MHz) Synthesizer Schematic Diagram (8486634Z02-O)

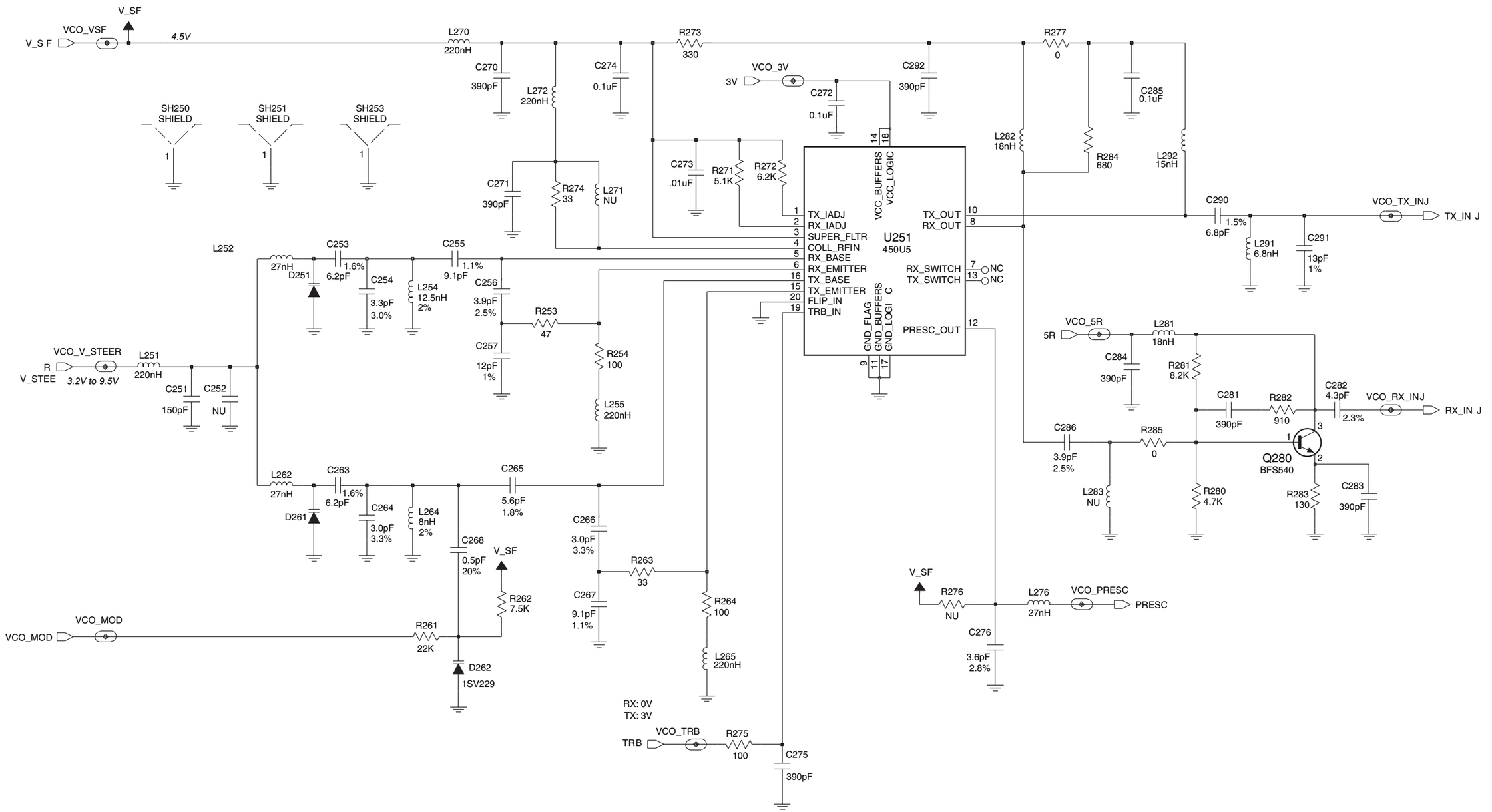


Figure 13-89. UHF (465–495 MHz) Voltage Controlled Oscillator Schematic Diagram (8486634Z02-O)

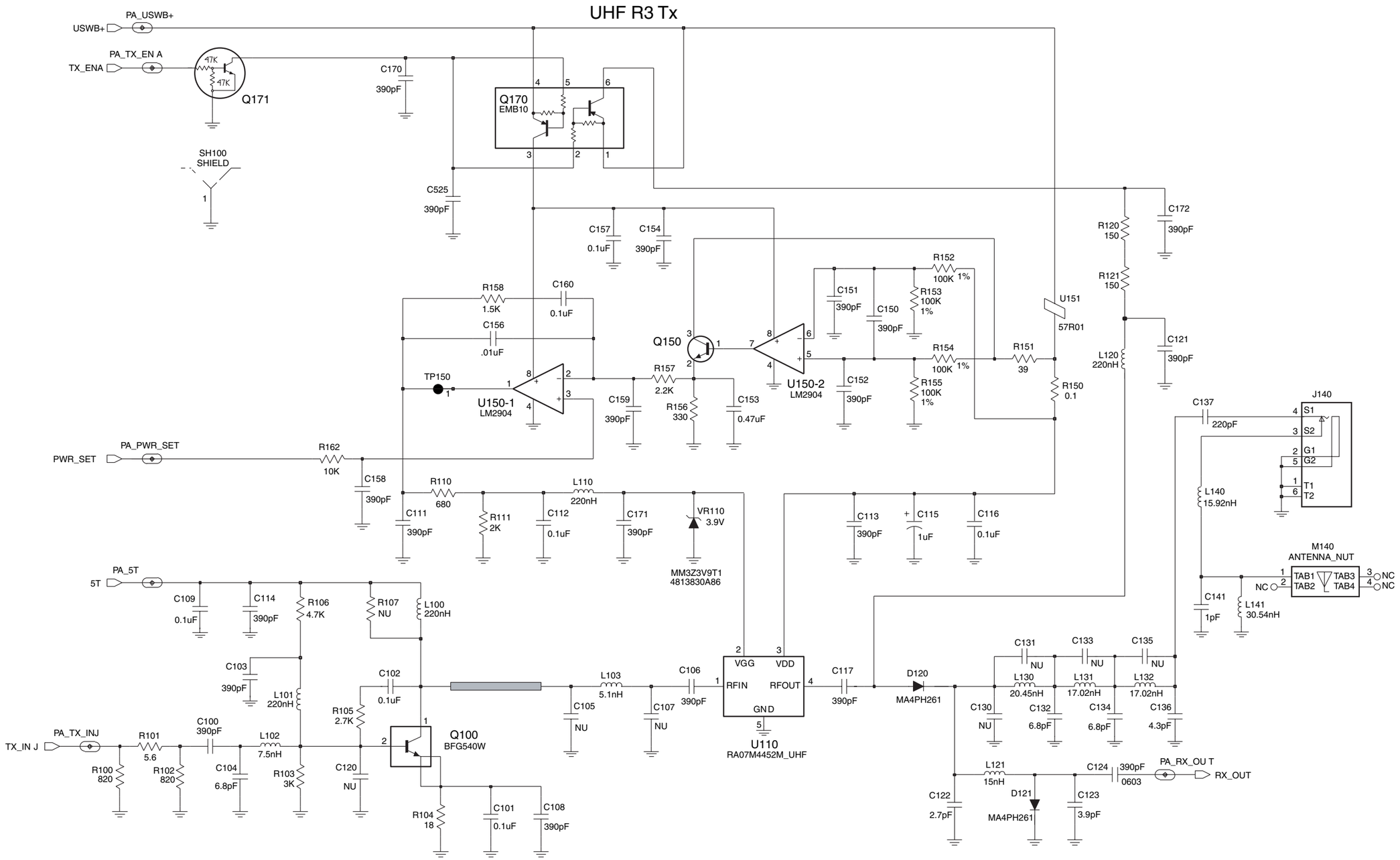


Figure 13-90. UHF (465–495 MHz) Transmitter and Power Control Schematic Diagram (8486634Z02-O)

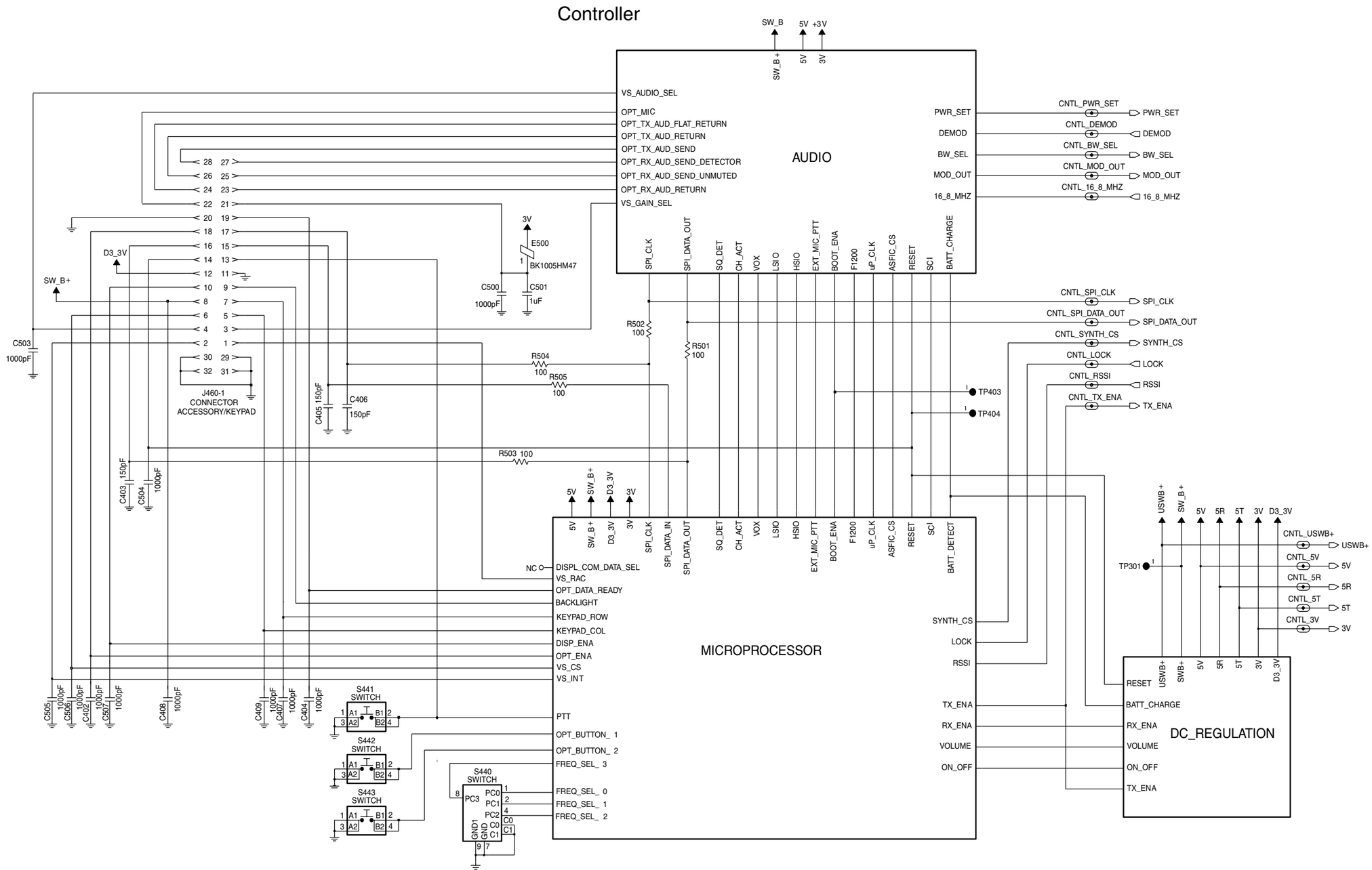


Figure 13-91. UHF (465–495 MHz) Controller Interconnect Schematic Diagram (8486634Z02-O)

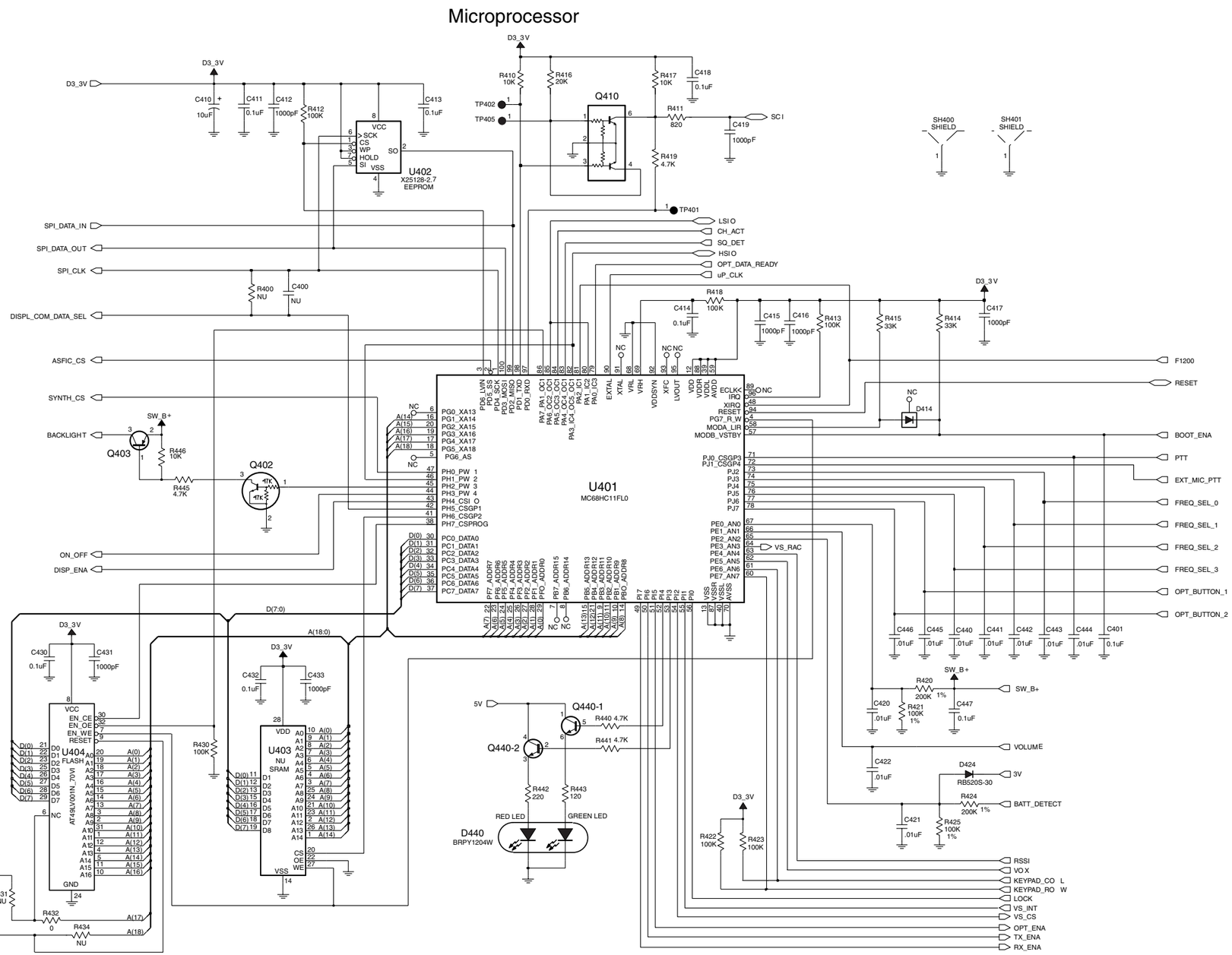
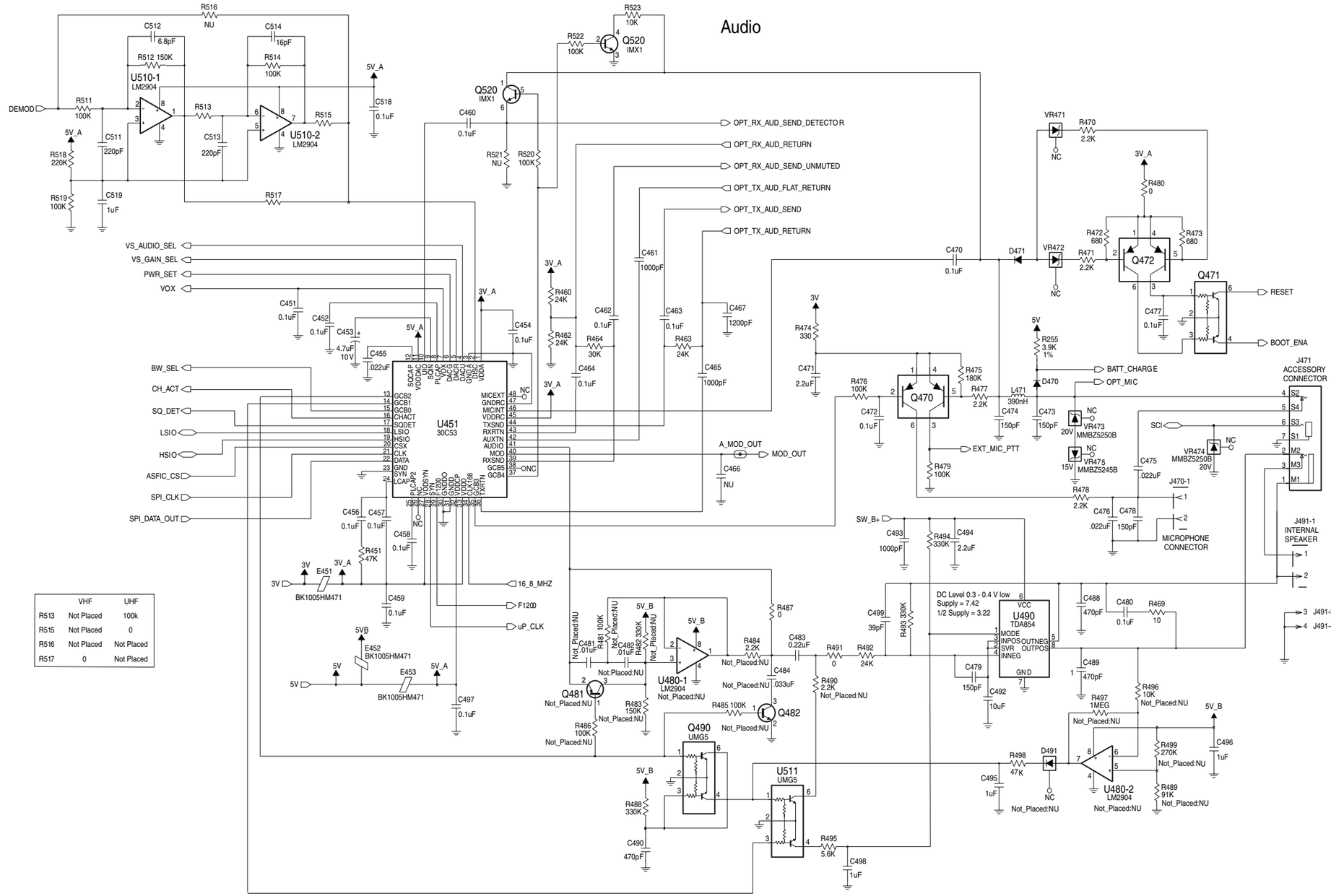


Figure 13-92. UHF (465–495 MHz) Microprocessor Circuitry Schematic Diagram (8486634Z02-O)



	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

Figure 13-93. UHF (465–495 MHz) Audio Circuitry Schematic Diagram (8486634Z02-O)

DC Regulation

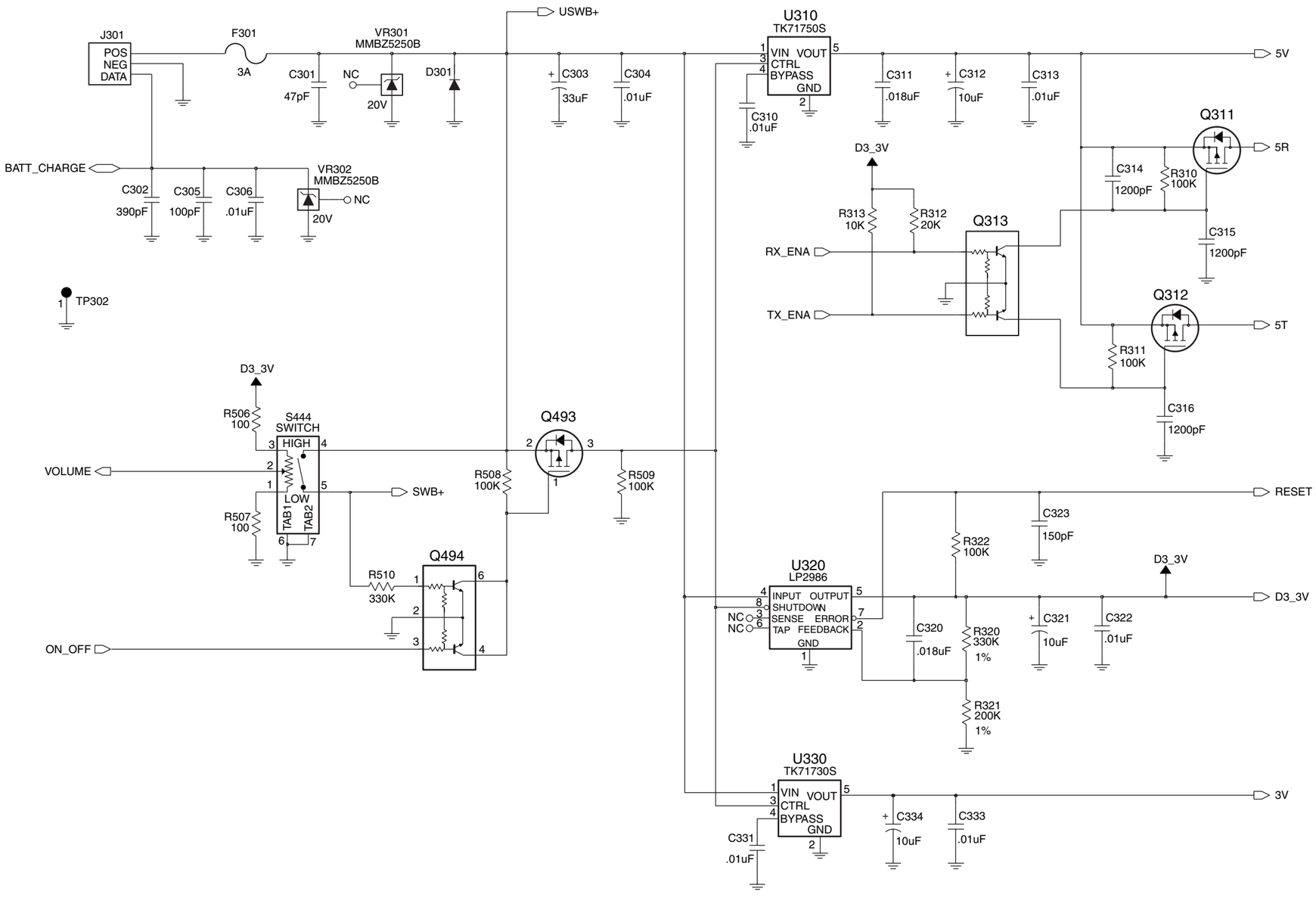


Figure 13-94. UHF (465–495 MHz) DC Regulation Schematic Diagram (8486634Z02-O)

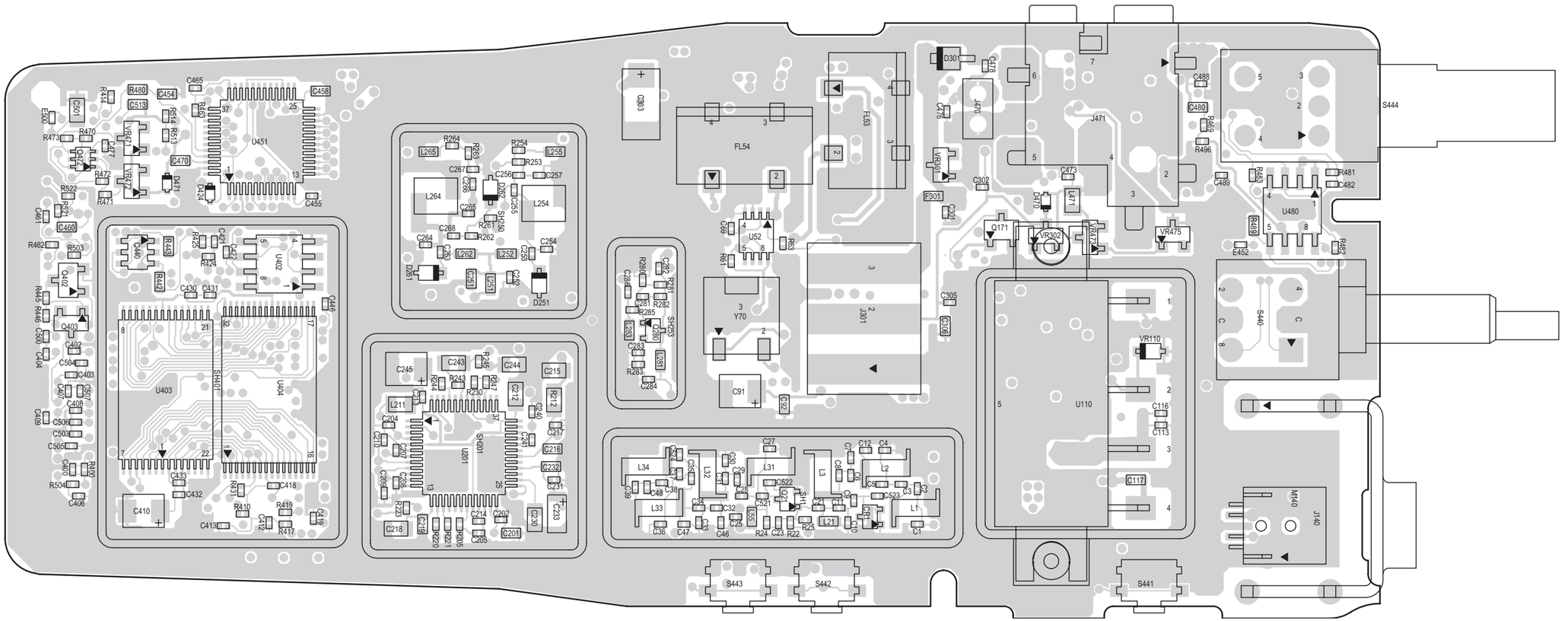


Figure 13-95. UHF (465–495 MHz) Board Component Side View (8486634Z02-O)

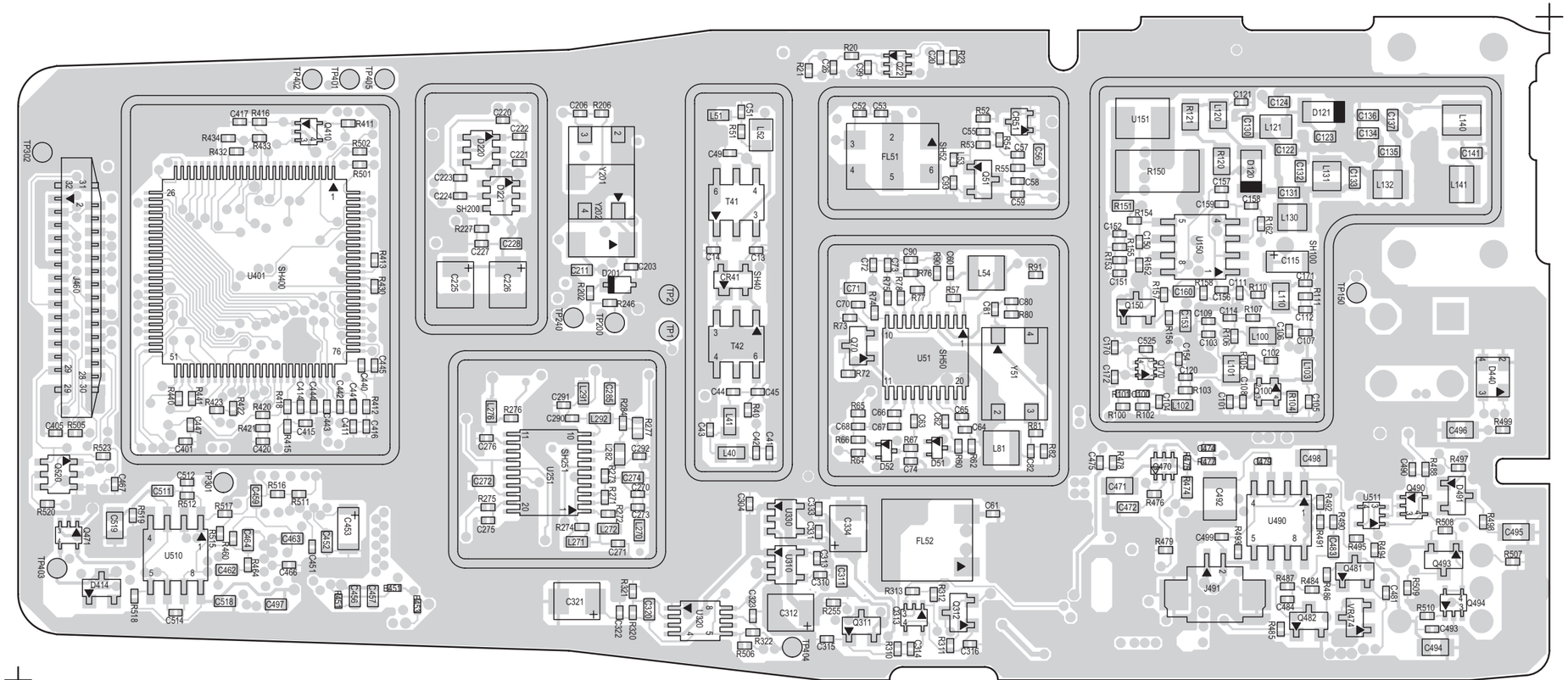


Figure 13-96. UHF (465–495 MHz) Board Solder Side View (8486634Z02-O)

UHF (465–495 MHz) Radio Parts List (8486634Z02-O)

Circuit Ref	Motorola Part No.	Description
C1	2109445U32	CAP, 8pF
C2	2109445U26	CAP, 9.1pF
C3	2109445U18	CAP, 4.3pF
C4	2109445U27	CAP, 10pF
C5	2109445U32	CAP, 8pF
C6	2109445U24	CAP, 7.5pF
C7	2109445U26	CAP, 9.1pF
C8	2109445U18	CAP, 4.3pF
C9	2109445U22	CAP, 6.2pF
C10	2109445U13	CAP, 2.7pF
C11	2113743L07	CAP, 390pF
C12	NOT PLACED	CAP, 8.2pF
C13	2109445U07	CAP, 1.5pF
C14	2109445U07	CAP, 1.5pF
C20	2113743L07	CAP, 390pF
C21	2109445U53	CAP, 68pF
C23	2113743L07	CAP, 390pF
C25	2113743L07	CAP, 390pF
C26	2113743L07	CAP, 390pF
C27	2109445U25	CAP, 8.2pF
C28	2109445U27	CAP, 10pF
C29	2109445U22	CAP, 6.2pF
C30	2109445U38	CAP, 16pF
C31	2109445U21	CAP, 5.6pF
C32	2109445U22	CAP, 6.2pF
C33	2109445U42	CAP, 24pF
C34	2109445U22	CAP, 6.2pF
C35	2109445U22	CAP, 6.2pF
C36	2109445U39	CAP, 18pF
C37	2109445U25	CAP, 8.2pF
C38	2109445U20	CAP, 5.1pF
C39	2109445U13	CAP, 2.7pF
C41	2109445U27	CAP, 10pF
C42	2109445U25	CAP, 8.2pF
C43	2109445U40	CAP, 20pF
C44	2109445U26	CAP, 9.1pF
C45	2109445U37	CAP, 15pF
C46	NOT PLACED	CAP, 10pF
C47	NOT PLACED	CAP, 10pF
C48	0662057M01	RES, 0
C49	NOT PLACED	CAP, 3.9pF
C51	2113743N48	CAP, 82pF
C52	2109445U41	CAP, 22pF
C53	2109445U26	CAP, 9.1pF
C55	2113743M24	CAP, 0.1uF
C56	2113743E20	CAP, 0.1uF
C57	2113743M24	CAP, 0.1uF
C58	2113743N16	CAP, 3.9pF
C59	2113743N12	CAP, 2.7pF
C60	2113743M24	CAP, 0.1uF
C61	2113743N46	CAP, 68pF
C62	2113743M24	CAP, 0.1uF
C63	2113743M24	CAP, 0.1uF
C64	2113743M24	CAP, 0.1uF
C65	2113743M24	CAP, 0.1uF
C66	2113743M24	CAP, 0.1uF
C67	2113743M24	CAP, 0.1uF
C68	2113743M24	CAP, 0.1uF
C69	2113743M24	CAP, 0.1uF
C70	2113743N53	CAP, 130pF
C71	2113743E20	CAP, 0.1uF
C72	2113743M24	CAP, 0.1uF
C73	2113743L33	CAP, 4700pF
C74	2113743N42	CAP, 47pF
C80	2109445U41	CAP, 22pF
C81	2109445U45	CAP, 33pF
C82	2109445U46	CAP, 36pF
C90	2113743M24	CAP, 0.1uF
C91	2311049A57	CAPP, 10uF
C92	2113743E20	CAP, 0.1uF
C93	NOT PLACED	CAP, 3.6pF
C99	2113743M24	CAP, 0.1uF
C100	2113743L07	CAP, 390pF
C101	2113743M24	CAP, 0.1uF
C102	2113743M24	CAP, 0.1uF
C103	2113743L07	CAP, 390pF
C104	2113743N22	CAP, 6.8pF
C105	NOT PLACED	CAP, 3.9pF
C106	2113743L07	CAP, 390pF
C107	NOT PLACED	CAP, 27pF
C108	2113743L07	CAP, 390pF
C109	2113743M24	CAP, 0.1uF
C111	2113743L07	CAP, 390pF
C112	2113743M24	CAP, 0.1uF
C113	2113743L07	CAP, 390pF
C114	2113743L07	CAP, 390pF
C115	2311049A07	CAPP, 1uF
C116	2113743M24	CAP, 0.1uF
C117	2113740F65	CAP, 390pF
C120	NOT PLACED	CAP, 8.2pF
C121	2113743L07	CAP, 390pF
C122	2113740F13	CAP, 2.7pF
C123	2113740F17	CAP, 3.9pF
C124	2113740F65	CAP, 390pF
C130	NOT PLACED	CAP, 3.3pF
C131	NOT PLACED	CAP, 2.2pF
C132	2113740F23	CAP, 6.8pF
C133	NOT PLACED	CAP, 2.7pF
C134	2113740F23	CAP, 6.8pF
C135	NOT PLACED	CAP, 0.5pF
C136	2113740F18	CAP, 4.3pF
C137	2113740F59	CAP, 220pF
C141	2113740F03	CAP, 1pF
C150	2113743L07	CAP, 390pF
C151	2113743L07	CAP, 390pF
C152	2113743L07	CAP, 390pF
C153	2113743K18	CAP, 0.47uF
C154	2113743L07	CAP, 390pF
C156	2113743L41	CAP, .01uF
C157	2113743M24	CAP, 0.1uF
C158	2113743L07	CAP, 390pF
C159	2113743L07	CAP, 390pF
C160	2113743E20	CAP, 0.1uF
C170	2113743L07	CAP, 390pF
C171	2113743L07	CAP, 390pF
C172	2113743L07	CAP, 390pF
C201	2113740F59	CAP, 220pF
C202	2109445U52	CAP, 62pF
C203	2109445U13	CAP, 2.7pF
C204	2113743L09	CAP, 470pF
C205	NOT PLACED	CAP, 2.7pF
C206	NOT PLACED	CAP, 1000pF
C207	2113743L09	CAP, 470pF
C208	2113743L09	CAP, 470pF
C209	2113743L09	CAP, 470pF
C210	2113743L09	CAP, 470pF
C211	2113743E20	CAP, 0.1uF
C212	2113743F18	CAP, 2.2uF
C213	2113743L41	CAP, .01uF
C214	2113743L17	CAP, 1000pF
C215	2113743F18	CAP, 2.2uF
C216	2113743E20	CAP, 0.1uF
C217	2113743L17	CAP, 1000pF
C218	2113743F18	CAP, 2.2uF
C219	2113743E20	CAP, 0.1uF
C220	2113743N34	CAP, 22pF
C221	2113743L41	CAP, .01uF
C222	2113743L41	CAP, .01uF
C223	2113743L41	CAP, .01uF
C224	2113743L41	CAP, .01uF
C225	2311049A57	CAPP, 10uF
C226	2311049A57	CAPP, 10uF
C227	2113743L17	CAP, 1000pF
C228	2113743E20	CAP, 0.1uF
C230	2113743F18	CAP, 2.2uF
C231	2113743L17	CAP, 1000pF
C232	2113743E20	CAP, 0.1uF
C233	2311049A56	CAPP, 4.7uF
C240	2109445U06	CAP, 1.3pF
C241	2113743N50	CAP, 100pF
C243	0886641Z01	CAP, 0.1uF
C244	0888600M25	CAP, .01uF
C245	2311049A08	CAPP, 1uF
C251	0888600M03	CAP, 150pF
C252	NOT PLACED	CAP, 390pF
C253	2109445U22	CAP, 6.2pF
C254	2109445U15	CAP, 3.3pF
C255	2109445U26	CAP, 9.1pF
C256	2109445U17	CAP, 3.9pF
C257	2109445U35	CAP, 12pF
C263	2109445U22	CAP, 6.2pF
C264	2109445U14	CAP, 3.0pF
C265	2109445U21	CAP, 5.6pF
C266	2109445U14	CAP, 3.0pF
C267	2109445U26	CAP, 9.1pF
C268	2109445U01	CAP, 0.5pF
C270	2113743L07	CAP, 390pF
C271	2113743L07	CAP, 390pF
C272	2113743E20	CAP, 0.1uF
C273	2113743L41	CAP, .01uF
C274	2113743E20	CAP, 0.1uF
C275	2113743L07	CAP, 390pF
C276	2109445U16	CAP, 3.6pF
C281	2113743L07	CAP, 390pF
C282	2109445U18	CAP, 4.3pF
C283	2113743L07	CAP, 390pF
C284	2113743L07	CAP, 390pF
C285	2113743E20	CAP, 0.1uF
C286	2109445U17	CAP, 3.9pF
C290	2109445U23	CAP, 6.8pF
C291	2109445U36	CAP, 13pF
C292	2113743L07	CAP, 390pF
C301	2113743N42	CAP, 47pF
C302	2113743L07	CAP, 390pF
C303	2311049A97	CAPP, 33uF
C304	2113743L41	CAP, .01uF
C305	2113743N50	CAP, 100pF
C306	2113741F49	CAP, .01uF
C310	2113743L41	CAP, .01uF
C311	2113743E05	CAP, .018uF
C312	2311049A57	CAPP, 10uF
C313	2113743L41	CAP, .01uF
C314	2113743L19	CAP, 1200pF
C315	2113743L19	CAP, 1200pF
C316	2113743L19	CAP, 1200pF
C320	2113743E05	CAP, .018uF
C321	2311049A57	CAPP, 10uF
C322	2113743L41	CAP, .01uF
C323	2113743N54	CAP, 150pF
C331	2113743L41	CAP, .01uF
C333	2113743L41	CAP, .01uF
C334	2311049A57	CAPP, 10uF
C400	NOT PLACED	CAP, .022uF

Circuit Ref	Motorola Part No.	Description
C401	2113743M24	CAP, 0.1uF
C402	2113743L17	CAP, 1000pF
C403	2113743N50	CAP, 150pF
C404	2113743L17	CAP, 1000pF
C405	2113743N50	CAP, 150pF
C406	2113743N50	CAP, 150pF
C407	2113743L17	CAP, 1000pF
C408	2113743L17	CAP, 1000pF
C409	2113743L17	CAP, 1000pF
C410	2311049A57	CAPP, 10uF
C411	2113743M24	CAP, 0.1uF
C412	2113743L17	CAP, 1000pF
C413	2113743M24	CAP, 0.1uF
C414	2113743M24	CAP, 0.1uF
C415	2113743L17	CAP, 1000pF
C416	2113743L17	CAP, 1000pF
C417	2113743L17	CAP, 1000pF
C418	2113743M24	CAP, 0.1uF
C419	2113743L17	CAP, 1000pF
C420	2113743L41	CAP, .01uF
C421	2113743L41	CAP, .01uF
C422	2113743L41	CAP, .01uF
C430	2113743M24	CAP, 0.1uF
C431	2113743L17	CAP, 1000pF
C432	2113743M24	CAP, 0.1uF
C433	2113743L17	CAP, 1000pF
C440	2113743L41	CAP, .01uF
C441	2113743L41	CAP, .01uF
C442	2113743L41	CAP, .01uF
C443	2113743L41	CAP, .01uF
C444	2113743L41	CAP, .01uF
C445	2113743L41	CAP, .01uF
C446	2113743L41	CAP, .01uF
C447	2113743M24	CAP, 0.1uF
C451	2113743M24	CAP, 0.1uF
C452	2113743E20	CAP, 0.1uF
C453	2311049A56	CAPP, 4.7uF
C454	2113743E20	CAP, 0.1uF
C455	2113743L48	CAP, .022uF
C456	2113743E20	CAP, 0.1uF
C457	2113743E20	CAP, 0.1uF
C458	2113743E20	CAP, 0.1uF
C459	2113743E20	CAP, 0.1uF
C460	2113743E20	CAP, 0.1uF
C461	2113743L17	CAP, 1000pF
C462	2113743E20	CAP, 0.1uF
C463	2113743E20	CAP, 0.1uF
C464	2113743E20	CAP, 0.1uF
C465	2113743L17	CAP, 1000pF
C466	NOT PLACED	CAP, 470pF
C467	2113743L19	CAP, 1200pF
C470	2113743E20	CAP, 0.1uF
C471	2113743F18	CAP, 2.2uF
C472	2113743E20	CAP, 0.1uF
C473	2113743N54	CAP, 150pF
C474	2113743N54	CAP, 150pF
C475	2113743L48	CAP, .022uF
C476	2113743L48	CAP, .022uF
C477	2113743M24	CAP, 0.1uF
C478	2113743N54	CAP, 150pF
C479	2113743N54	CAP, 150pF
C480	2113743E20	CAP, 0.1uF
C481	NOT PLACED	CAP, .01uF
C482	NOT PLACED	CAP, .01uF
C483	2113928H02	CAP, 0.22uF
C484	NOT PLACED	CAP, .033uF
C488	2113743L09	CAP, 470pF
C489	2113743L09	CAP, 470pF
C490	2113743L09	CAP, 470pF
C492	2113928J08	CAP, 10uF
C493	2113743L17	CAP, 1000pF
C494	2113743F18	CAP, 2.2uF
C495	2113743F16	CAP, 1uF
C496	2113743F16	CAP, 1uF
C497	2113743E20	CAP, 0.1uF
C498	2113743F16	CAP, 1uF
C499	2113743N40	CAP, 39pF
C500	2113743L17	CAP, 1000pF
C501	2113743F16	CAP, 1uF
C503	2113743L17	CAP, 1000pF
C504	2113743L17	CAP, 1000pF
C505	2113743L17	CAP, 1000pF
C506	2113743L17	CAP, 1000pF
C507	2113743L17	CAP, 1000pF
C511	2113740F59	CAP, 220pF
C512	2113743N22	CAP, 6.8pF
C513	2113740F59	CAP, 220pF
C514	2113743N31	CAP, 16pF
C518	2113743E20	CAP, 0.1uF
C519	2113743F16	CAP, 1uF
C521	2109445U13	CAP, 2.7pF
C522	2113743N01	CAP, 0.5pF
C523	2186463Z03	CAP, 0.5pF
C524	2186463Z03	CAP, 0.5pF
C525	2113743L07	CAP, 390pF
CR1	4813825A19	MMBD352
CR41	4802246J04	HSMS2829
CR51	4813825A19	MMBD352
D51	4802245J97	DAN235ETL
D52	4802245J97	DAN235ETL
D120	4880973Z02	MA4PH261
D121	4880973Z02	MA4PH261
D201	4862824C03	1SV232
D220	4802233J09	IMN10
D221	4802233J09	IMN10
D251	4862824C01	1SV229
D261	4862824C01	1SV229
D262	4862824C01	1SV229
D301	4813833A19	MBRM120ET3
D414	4805129M41	MMBD501
D424	4809924D18	RB520S-30
D440	4805729G49	BRPY1204W
D470	4809924D18	RB520S-30
D471	4809924D18	RB520S-30
D491	NOT PLACED	MMBD501
E451	2480640Z01	BK1005HM471
E452	2480640Z01	BK1005HM471
E453	2480640Z01	BK1005HM471
E500	2480640Z01	BK1005HM471
F301	6580542Z01	FUSE
FL51	9180022M11	MXF45
FL52	9180468V04	FLTR
FL53	9180469V05	CFWC455E
FL54	9180469V03	CFWC455G
J140	0986428Z01	CONN_J
J301	0986565Z01	CONN_J
J460	NOT PLACED	CONN_J
J470	0985818A01	CONN_J
J471	0980683Z03	CONN_J
J491	2809926G01	CONN_P
L1	2409348J15	IDCTR, 9.85nH
L2	2409348J15	IDCTR, 9.85nH
L3	2409348J15	IDCTR, 9.85nH
L21	2413926N18	IDCTR, 33nH
L31	2409348J15	IDCTR, 9.85nH
L32	2409348J15	IDCTR, 9.85nH
L33	2409348J15	IDCTR, 9.85nH
L34	2409348J15	IDCTR, 9.85nH
L40	2413926K16	IDCTR, 27nH
L41	2413926K16	IDCTR, 27nH
L51	2413926N26	IDCTR, 150nH
L52	2462587V43	IDCTR, 560nH
L53	2113743N52	CAP, 120pF
L54	2413923A25	IDCTR, 1.2uH
L55	2413926N16	IDCTR, 22nH
L81	2413923A19	IDCTR, 1uH
L100	2413926K27	IDCTR, 220nH
L101	2413926K27	IDCTR, 220nH
L102	2409377M25	IDCTR, 7.5nH
L103	2409377M24	IDCTR, 5.1nH
L110	2413926K27	IDCTR, 220nH
L120	2413926K27	IDCTR, 220nH
L121	2462587V24	IDCTR, 15nH
L130	2460591C36	IDCTR, 20.45nH
L131	2460591C40	IDCTR, 17.02nH
L132	2460591C40	IDCTR, 17.02nH
L140	2460591L14	IDCTR, 15.92nH
L141	2479990M01	IDCTR, 30.54nH
L211	2413926K30	IDCTR, 390nH
L251	2413926N28	IDCTR, 220nH
L252	2413926N17	IDCTR, 27nH
L254	2484562T11	IDCTR, 12.5nH
L255	2413926N28	IDCTR, 220nH
L262	2413926N17	IDCTR, 27nH
L264	2484562T13	IDCTR, 8nH
L265	2413926N28	IDCTR, 220nH
L270	2413926N28	IDCTR, 220nH
L271	NOT PLACED	IDCTR, 220nH
L272	2413926N28	IDCTR, 220nH
L276	2413926N17	IDCTR, 27nH
L281	2413926N15	IDCTR, 18nH
L282	2413926N15	IDCTR, 18nH
L283	NOT PLACED	IDCTR, 22nH
L291	2413926N10	IDCTR, 6.8nH
L292	2413926N14	IDCTR, 15nH
L471	2413926K30	IDCTR, 390nH
M140	0286427Z01	ANTENNA_NUT
Q21	4802247J01	BFS505
Q22	4805723X02	UMT1
Q51	4802197J95	PBR941
Q70	4880214G02	MMBT3904
Q100	4885593U03	BFG540W
Q150	4880214G02	MMBT3904
Q170	4809939C34	EMB10
Q171	4880048M01	DTC144EKA
Q280	4802245J95	BFS540
Q311	4809579E18	TP0101T
Q312	4809579E18	TP0101T
Q313	4802245J54	UMG5
Q402	4880048M01	DTC144EKA
Q403	4813824A17	MMBT3906
Q410	4802245J54	UMG5
Q440	5180159R01	IMX1
Q470	4805723X02	UMT1
Q471	4802245J54	UMG5
Q472	4805723X02	UMT1
Q481	NOT PLACED	MMBT3906
Q482	NOT PLACED	MMBT3904
Q490	4802245J54	UMG5
Q493	4809579E18	TP0101T
Q494	4802245J54	UMG5
Q520	5180159R01	IMX1
R20	0662057M92	RES, 5.6K
R21	0662057M49	RES, 91

Circuit Ref	Motorola Part No.	Description
R22	0662057M92	RES, 5.6K
R23	0662057N09	RES, 27K
R24	0662057M76	RES, 1.2K
R25	0662057M92	RES, 5.6K
R40	0662057M74	RES, 1K
R51	0662057M43	RES, 51
R52	0662057N01	RES, 12K
R53	0662057N11	RES, 33K
R54	0662057M91	RES, 5.1K
R55	0662057M62	RES, 330
R57	0662057M90	RES, 4.7K
R60	0662057M83	RES, 2.4K
R61	0662057N23	RES, 100K
R62	0662057M86	RES, 3.3K
R63	0662057N13	RES, 39K
R64	0662057N06	RES, 20K
R65	0662057N13	RES, 39K
R66	0662057N06	RES, 20K
R67	0662057N06	RES, 20K
R72	0662057M64	RES, 390
R73	0662057M80	RES, 1.8K
R74	0662057M76	RES, 1.2K
R75	0662057N01	RES, 12K
R76	0662057V04	RES, 12K
R77	0662057U99	RES, 8.2K
R78	0662057M70	RES, 680
R80	0662057M91	RES, 5.1K
R81	0662057M74	RES, 1K
R82	NOT PLACED	RES, 0
R90	0662057M43	RES, 51
R91	0662057M79	RES, 1.6K
R100	0662057M72	RES, 820
R101	0662057M20	RES, 5.6
R102	0662057M72	RES, 820
R103	0662057M85	RES, 3K
R104	0662057A07	RES, 18
R105	0662057M84	RES, 2.7K
R106	0662057M90	RES, 4.7K
R107	NOT PLACED	RES, 300
R110	0662057M70	RES, 680
R111	0662057M81	RES, 2K
R120	0662057C55	RES, 150
R121	0662057C55	RES, 150
R150	0680539Z01	RES, 0.1
R151	0662057A15	RES, 39
R152	0662057V27	RES, 100K
R153	0662057V27	RES, 100K
R154	0662057V27	RES, 100K
R155	0662057V27	RES, 100K
R156	0662057M62	RES, 330
R157	0662057M82	RES, 2.2K
R158	0662057M78	RES, 1.5K
R162	0662057M98	RES, 10K
R202	0662057N27	RES, 150K
R205	0662057M50	RES, 100
R206	NOT PLACED	RES, 100
R212	0662057C01	RES, 0
R220	0662057M34	RES, 22
R221	0662057M34	RES, 22
R223	0662057M50	RES, 100
R227	0662057N13	RES, 39K
R230	0662057N06	RES, 20K
R243	0662057M72	RES, 820
R244	0662057M43	RES, 51
R245	0662057M78	RES, 1.5K
R246	0662057N23	RES, 100K
R247	0662057N14	RES, 43K
R253	0662057M42	RES, 47
R254	0662057M50	RES, 100
R255	0662057U91	RES, 3.9K
R261	0662057N07	RES, 22K
R262	0662057M95	RES, 7.5K
R263	0662057M38	RES, 33
R264	0662057M50	RES, 100
R271	0662057M91	RES, 5.1K
R272	0662057M93	RES, 6.2K
R273	0662057M62	RES, 330
R274	0662057M38	RES, 33
R275	0662057M50	RES, 100
R276	NOT PLACED	RES, 1K
R277	0662057B47	RES, 0
R280	0662057M90	RES, 4.7K
R281	0662057M96	RES, 8.2K
R282	0662057M73	RES, 910
R283	0662057M53	RES, 130
R284	0662057M70	RES, 680
R285	0662057M01	RES, 0
R310	0662057N23	RES, 100K
R311	0662057N23	RES, 100K
R312	0662057N06	RES, 20K
R313	0662057M98	RES, 10K
R320	0662057V43	RES, 330K
R321	0662057V35	RES, 200K
R322	0662057N23	RES, 100K
R400	NOT PLACED	RES, 100K
R410	0662057M98	RES, 10K
R411	0662057M72	RES, 820
R412	0662057N23	RES, 100K
R413	0662057N23	RES, 100K
R414	0662057N11	RES, 33K
R415	0662057N11	RES, 33K
R416	0662057N06	RES, 20K
R417	0662057M98	RES, 10K
R418	0662057N23	RES, 100K
R419	0662057M90	RES, 4.7K
R420	0662057V35	RES, 200K
R421	0662057V27	RES, 100K
R422	0662057N23	RES, 100K
R423	0662057N23	RES, 100K
R424	0662057V35	RES, 200K
R425	0662057V27	RES, 100K
R430	0662057N23	RES, 100K
R431	NOT PLACED	RES, 100K
R432	0662057M01	RES, 0
R433	0662057N23	RES, 100K
R434	NOT PLACED	RES, 100K
R440	0662057M90	RES, 4.7K
R441	0662057M90	RES, 4.7K
R442	0662057A33	RES, 220
R443	0662057A27	RES, 120
R445	0662057M90	RES, 4.7K
R446	0662057M98	RES, 10K
R451	0662057N15	RES, 47K
R460	0662057N08	RES, 24K
R462	0662057N08	RES, 24K
R463	0662057N08	RES, 24K
R464	0662057N10	RES, 30K
R469	0662057M26	RES, 10
R470	0662057M82	RES, 2.2K
R471	0662057M82	RES, 2.2K
R472	0662057M70	RES, 680
R473	0662057M70	RES, 680
R474	0662057A37	RES, 330
R475	0662057N29	RES, 180K
R476	0662057N23	RES, 100K
R477	0662057M82	RES, 2.2K
R478	0662057M82	RES, 2.2K
R479	0662057N23	RES, 100K
R480	0662057B47	RES, 0
R481	NOT PLACED	RES, 100K
R482	NOT PLACED	RES, 330K
R483	NOT PLACED	RES, 150K
R484	NOT PLACED	RES, 2.2K
R485	NOT PLACED	RES, 100K
R486	NOT PLACED	RES, 100K
R487	0662057M01	RES, 0
R488	0662057N35	RES, 330K
R489	NOT PLACED	RES, 91K
R490	NOT PLACED	RES, 2.2K
R491	0662057M01	RES, 0
R492	0662057N08	RES, 24K
R493	0662057N35	RES, 330K
R494	0662057V43	RES, 330K
R495	0662057M92	RES, 5.6K
R496	NOT PLACED	RES, 10K
R497	NOT PLACED	RES, 1MEG
R498	NOT PLACED	RES, 47K
R499	NOT PLACED	RES, 270K
R501	0662057M50	RES, 100
R502	0662057M50	RES, 100
R503	0662057M50	RES, 100
R504	0662057M50	RES, 100
R505	0662057M50	RES, 100
R506	0662057M50	RES, 100
R507	0662057M50	RES, 100
R508	0662057N23	RES, 100K
R509	0662057N23	RES, 100K
R510	0662057N35	RES, 330K
R511	0662057N23	RES, 100K
R512	0662057N27	RES, 150K
R513	0662057N23	RES, 100K
R514	0662057N23	RES, 100K
R515	0662057M01	RES, 0
R516	NOT PLACED	RES, 0
R517	NOT PLACED	RES, 0
R518	0662057N31	RES, 220K
R519	0662057N23	RES, 100K
R520	0662057N23	RES, 100K
R521	NOT PLACED	RES, 100K
R522	0662057N23	RES, 100K
R523	0662057M98	RES, 10K
S440	4080710Z22	switch, rotary 16-channel select
	or 4080710Z13	switch, rotary 4-channel select
S441	4070354A01	SWITCH
S442	4070354A01	SWITCH
S443	4070354A01	SWITCH
S444	1880619Z02	SWITCH
SH1	2686421Z01	SHIELD
SH40	2686419Z01	SHIELD
SH50	2686423Z01	SHIELD
SH52	2686424Z01	SHIELD
SH100	2686418Z01	SHIELD
SH200	2686424Z01	SHIELD
SH201	2686423Z01	SHIELD
SH250	2686425Z01	SHIELD
SH251	2686425Z01	SHIELD
SH253	2686422Z01	SHIELD
SH400	2686420Z01	SHIELD
SH401	2686420Z01	SHIELD
T41	2580541Z02	XFMR
T42	2580541Z02	XFMR
U51	5186144B01	SA616

Circuit Ref	Motorola Part No.	Description
U52	5109522E10	TC7W04F
U110	0186438Z02	RA07M4452M_UHF
U150	5113818A01	LM2904
U151	2484657R01	57R01
U201*	5185963A27	63A27
U251	5105750U54	50U54
U310	5102478J01	TK71750S
U320	5185963A55	LP2986
U330	5102479J01	TK71730S
U401*	5102226J56	MC68HC11FL0
U402*	5102463J64	X25128-2.7
U403	NOT PLACED	SRM2B256
U404*	5102480J01	AT49LV001N_70VI
U451	5185130C53	30C53
U480	NOT PLACED	LM2904
U490	5108858K99	TDA8541
U510	5113818A01	LM2904
U511	4802245J54	UMG5
VR110	4813830A86	MM3Z3V9T1
VR301	4813830A33	MMBZ5250B
VR302	4813830A33	MMBZ5250B
VR471	4813830A18	MMBZ5235B
VR472	4813830A09	MMBZ5226B
VR473	4813830A33	MMBZ5250B
VR474	4813830A33	MMBZ5250B
VR475	4880140L20	MMBZ5245B
Y51	4802245J84	TSS2_44_395MHZ
Y70	9186145B02	45B02
Y201*	4880114R06	14R06
Y202	NOT PLACED	45J68

* Motorola Depot Servicing only

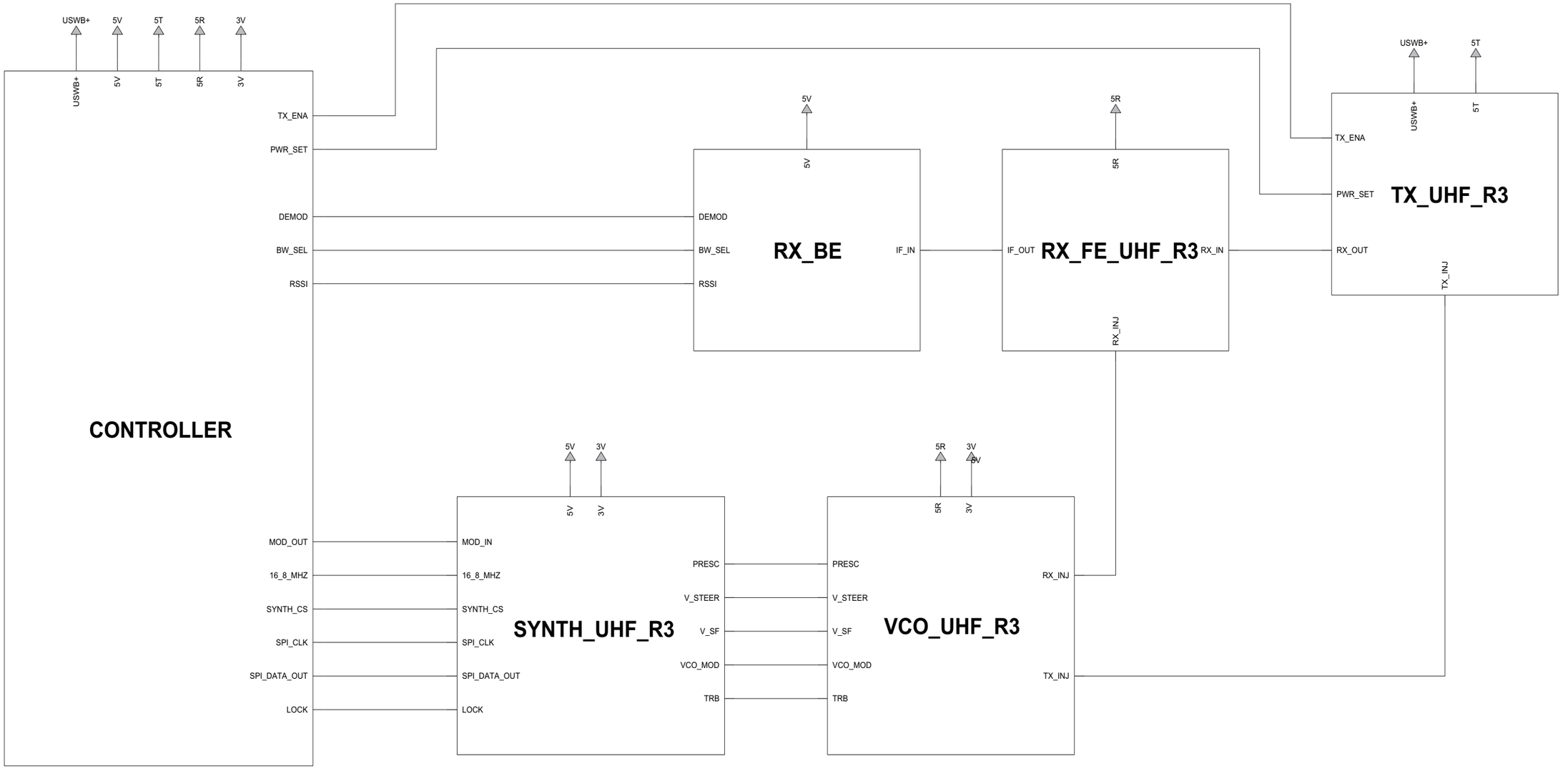


Figure 13-97. UHF (465–495 MHz) Radio Circuit Block Diagram (8416847H01-A/02-B)

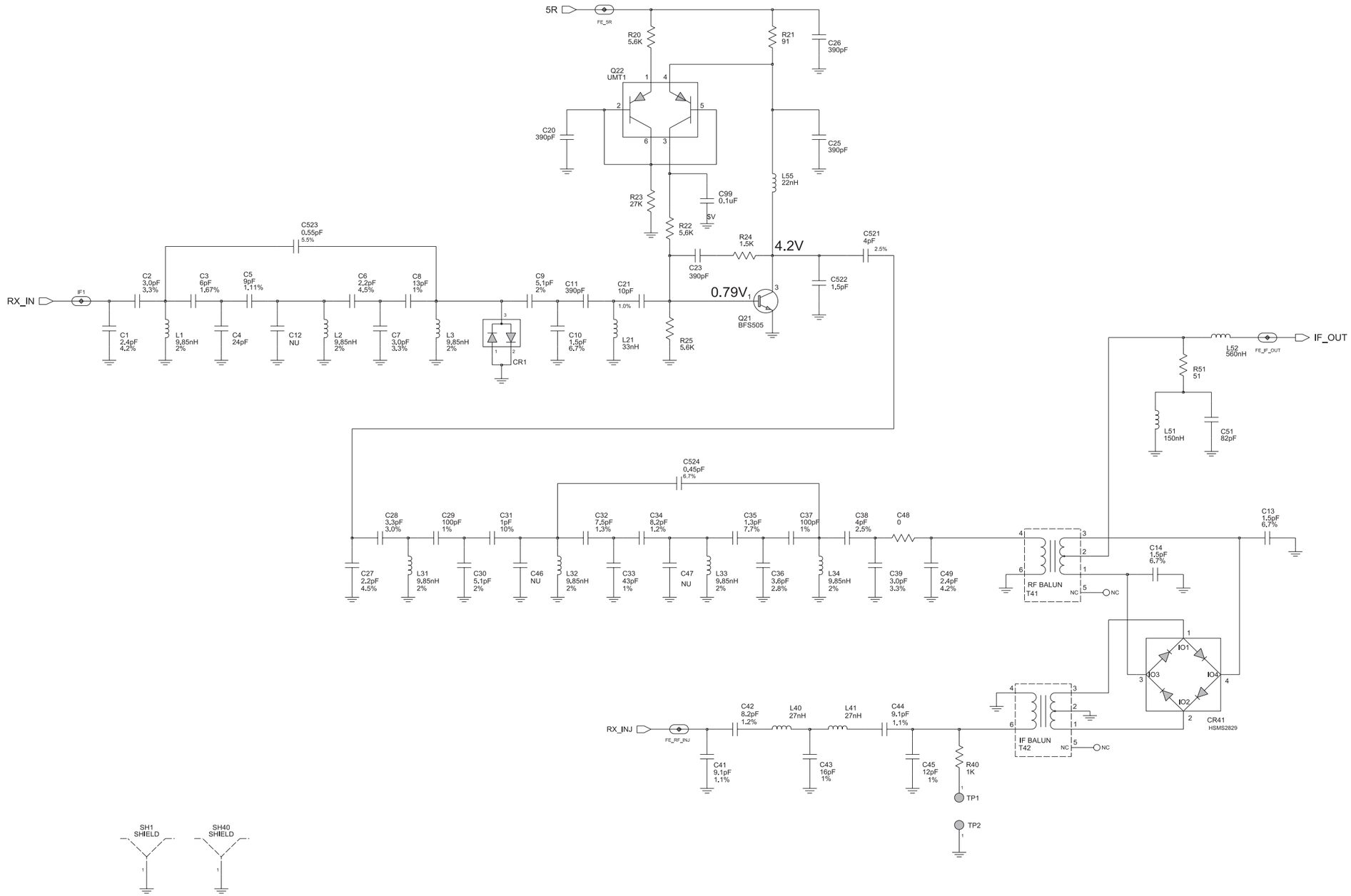


Figure 13-98. UHF (465–495 MHz) Receiver Front End Schematic Diagram (8416847H01-A/02-B)

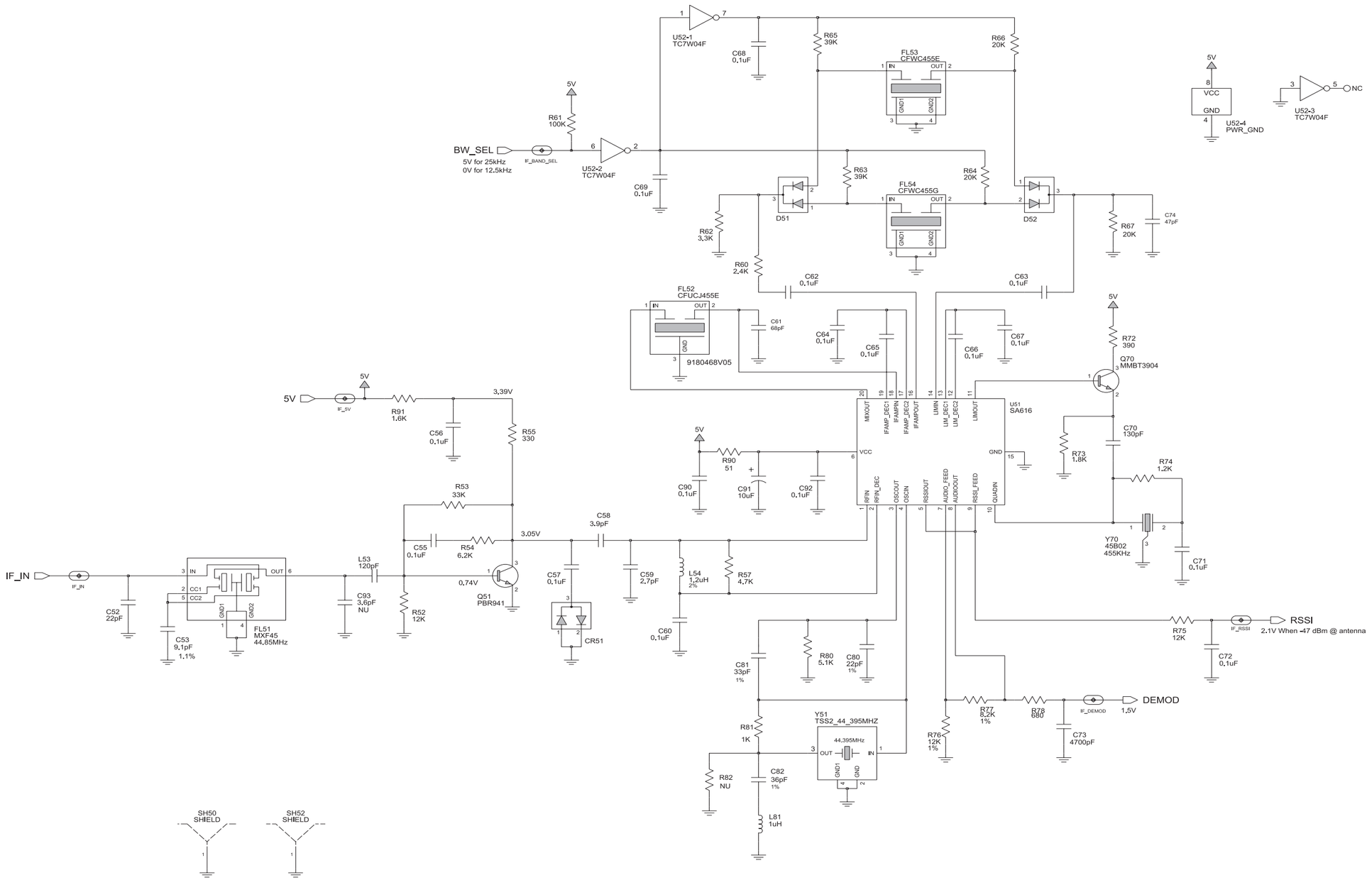
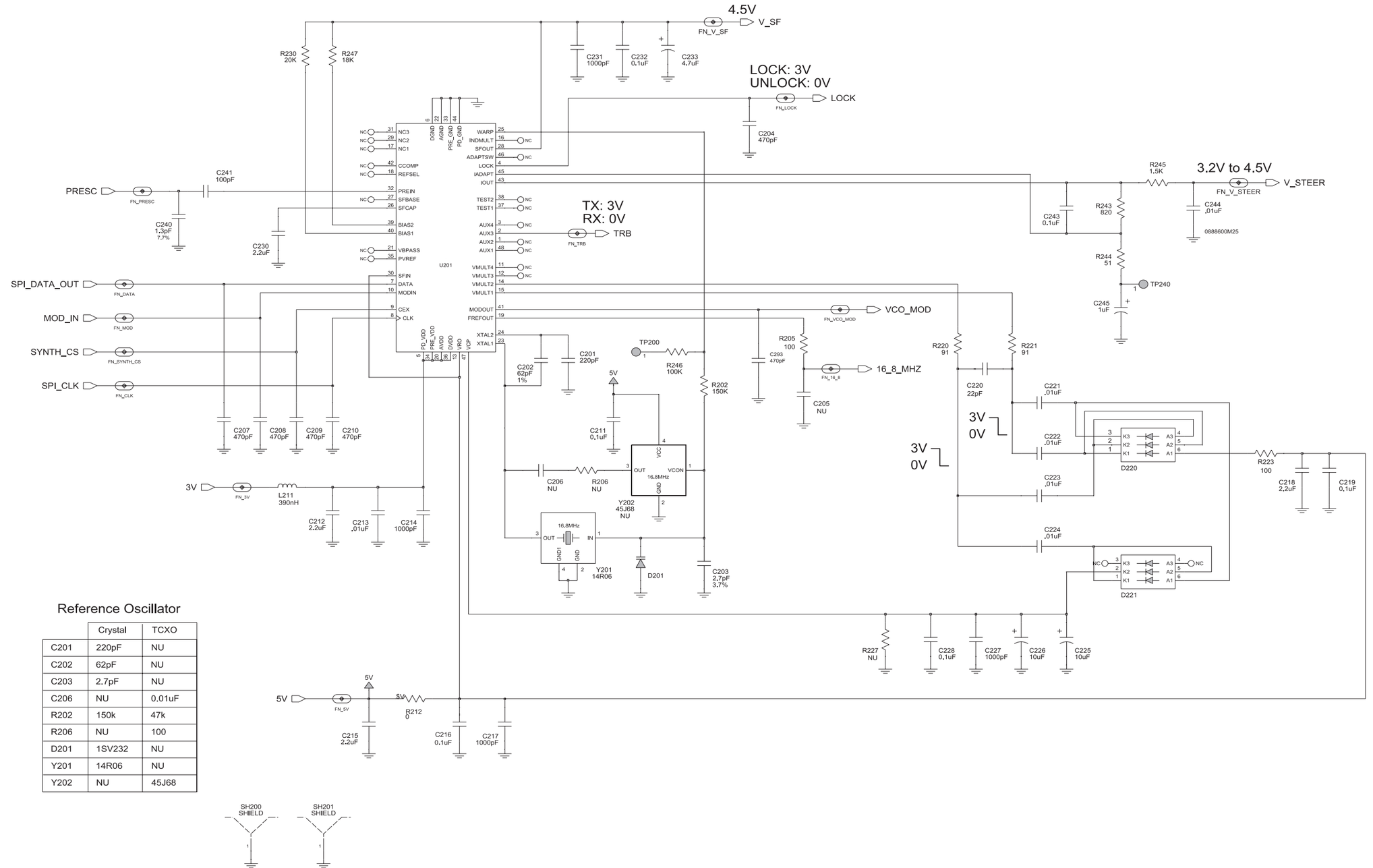


Figure 13-99. UHF (465–495 MHz) Receiver Back End Schematic Diagram (8416847H01-A/02-B)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 13-100. UHF (465–495 MHz) Synthesizer Schematic Diagram (8416847H01-A/02-B)

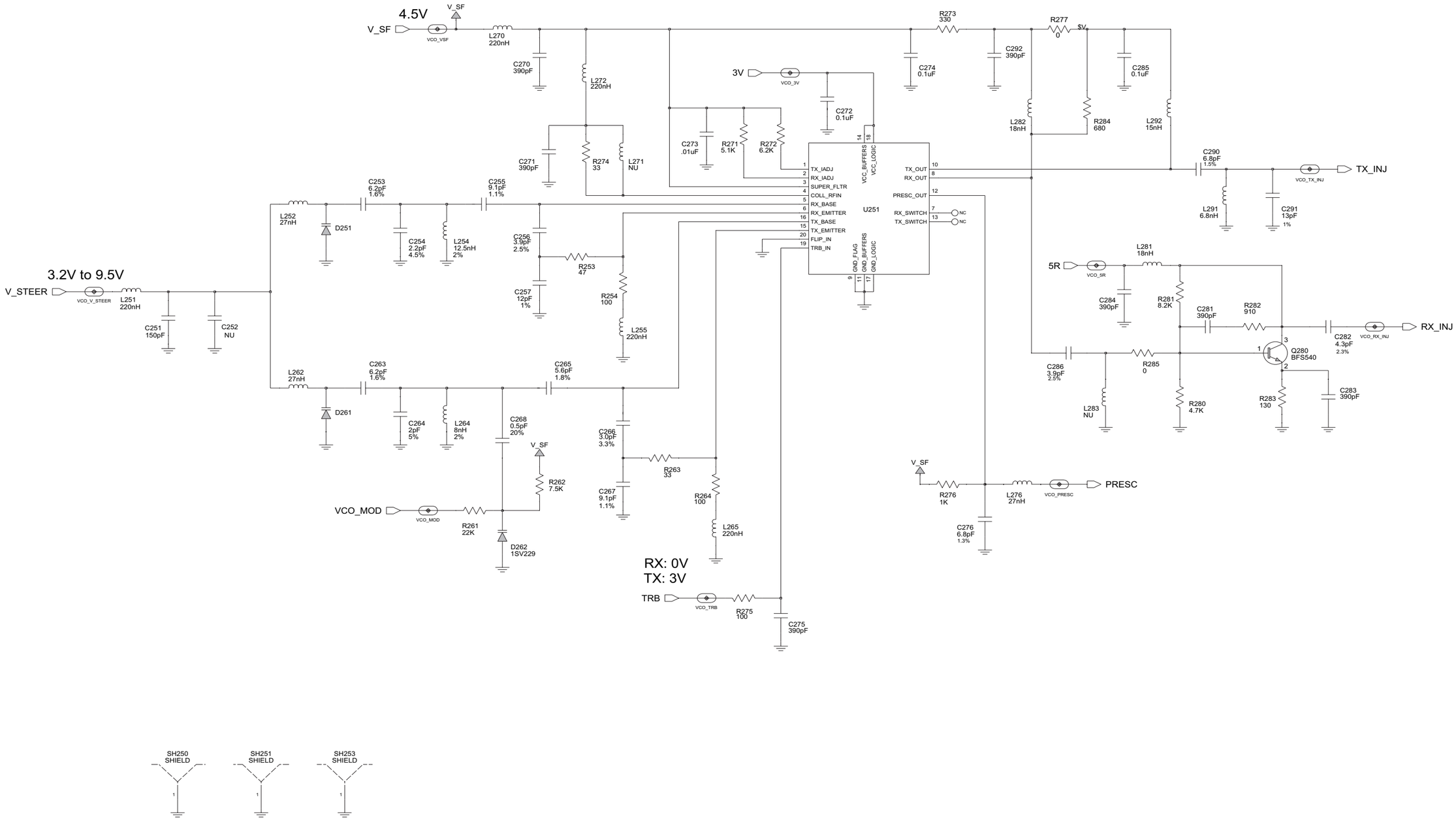


Figure 13-101. UHF (465–495 MHz) Voltage Controlled Oscillator Schematic Diagram (8416847H01-A/02-B)

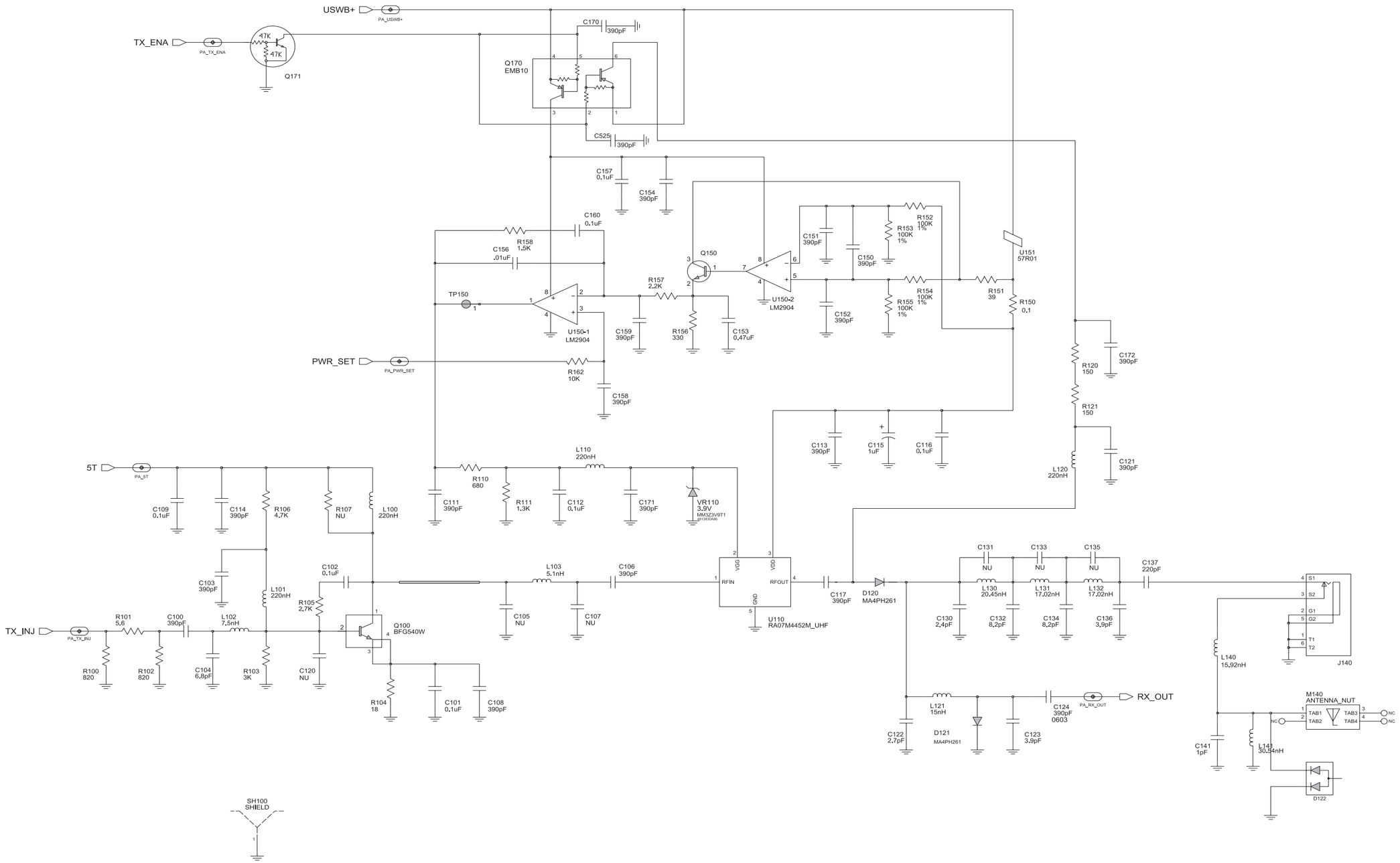


Figure 13-102. UHF (465–495 MHz) Transmitter and Power Control Schematic Diagram (8416847H01-A/02-B)

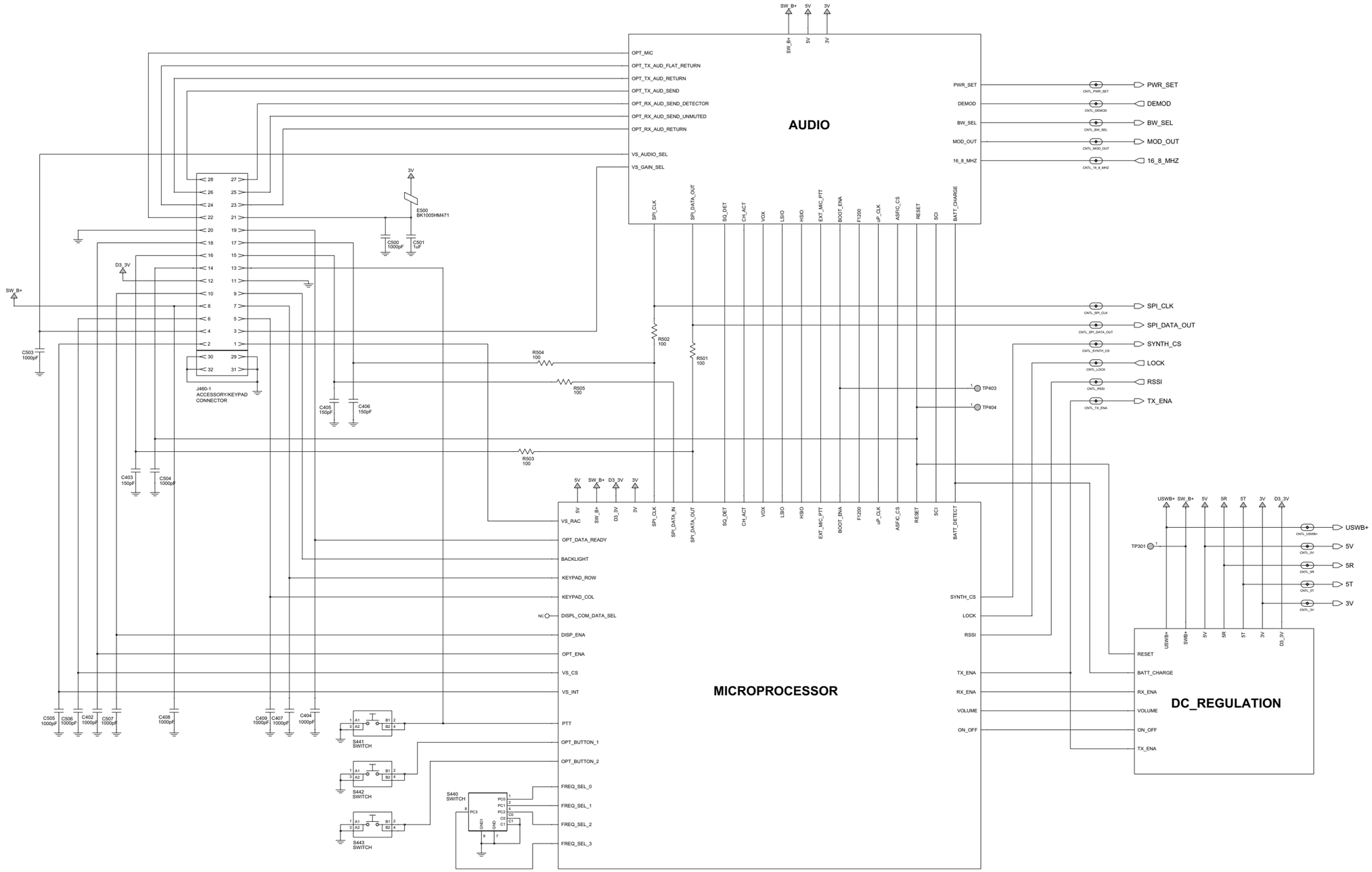


Figure 13-103. UHF (465–495 MHz) Controller Interconnect Schematic Diagram (8416847H01-A/02-B)

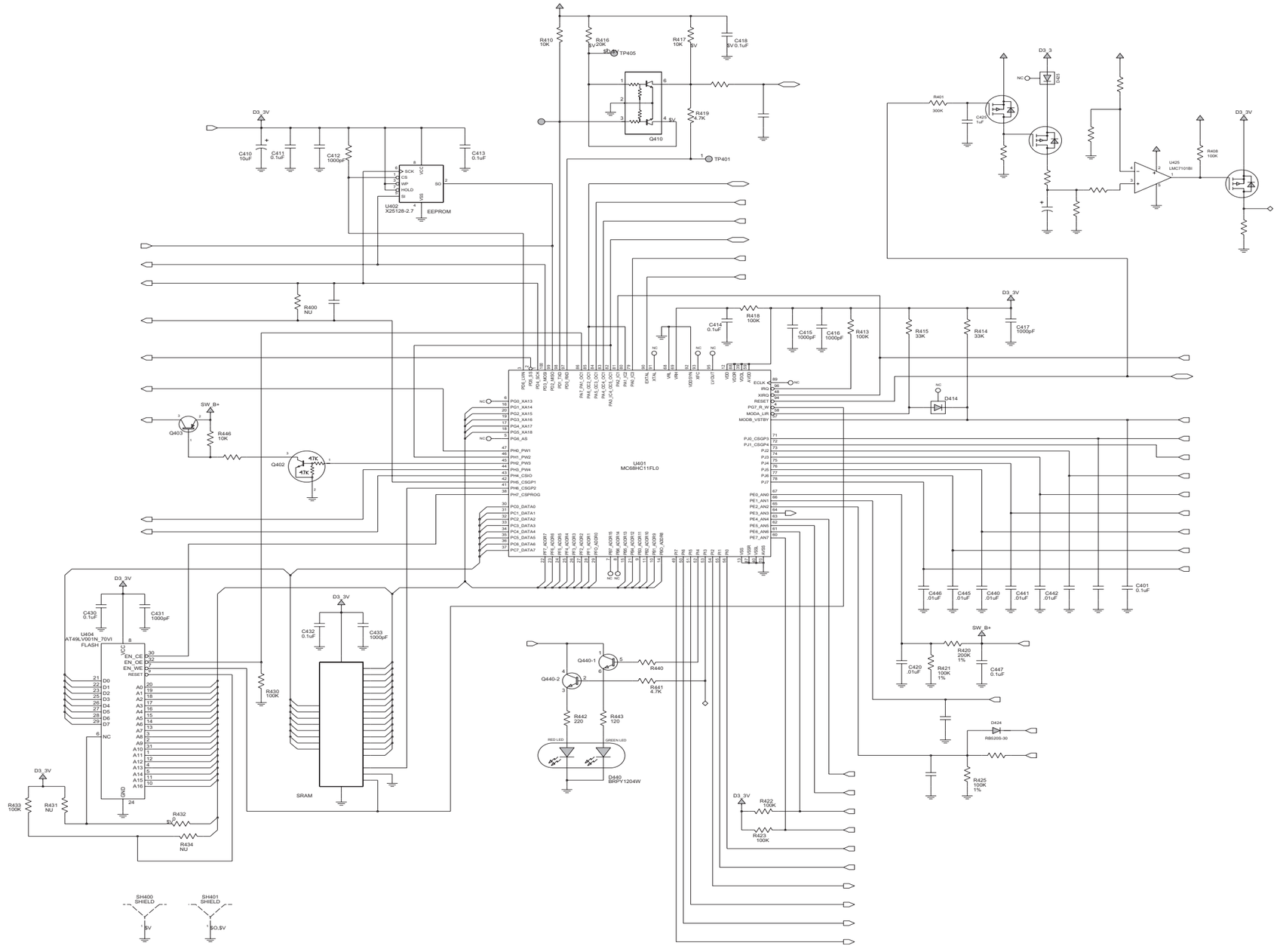


Figure 13-104. UHF (465–495 MHz) Microprocessor Circuitry Schematic Diagram (8416847H01-A/02-B)

	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

Figure 13-105. UHF (465–495 MHz) Audio Circuitry Schematic Diagram (8416847H01-A/02-B)

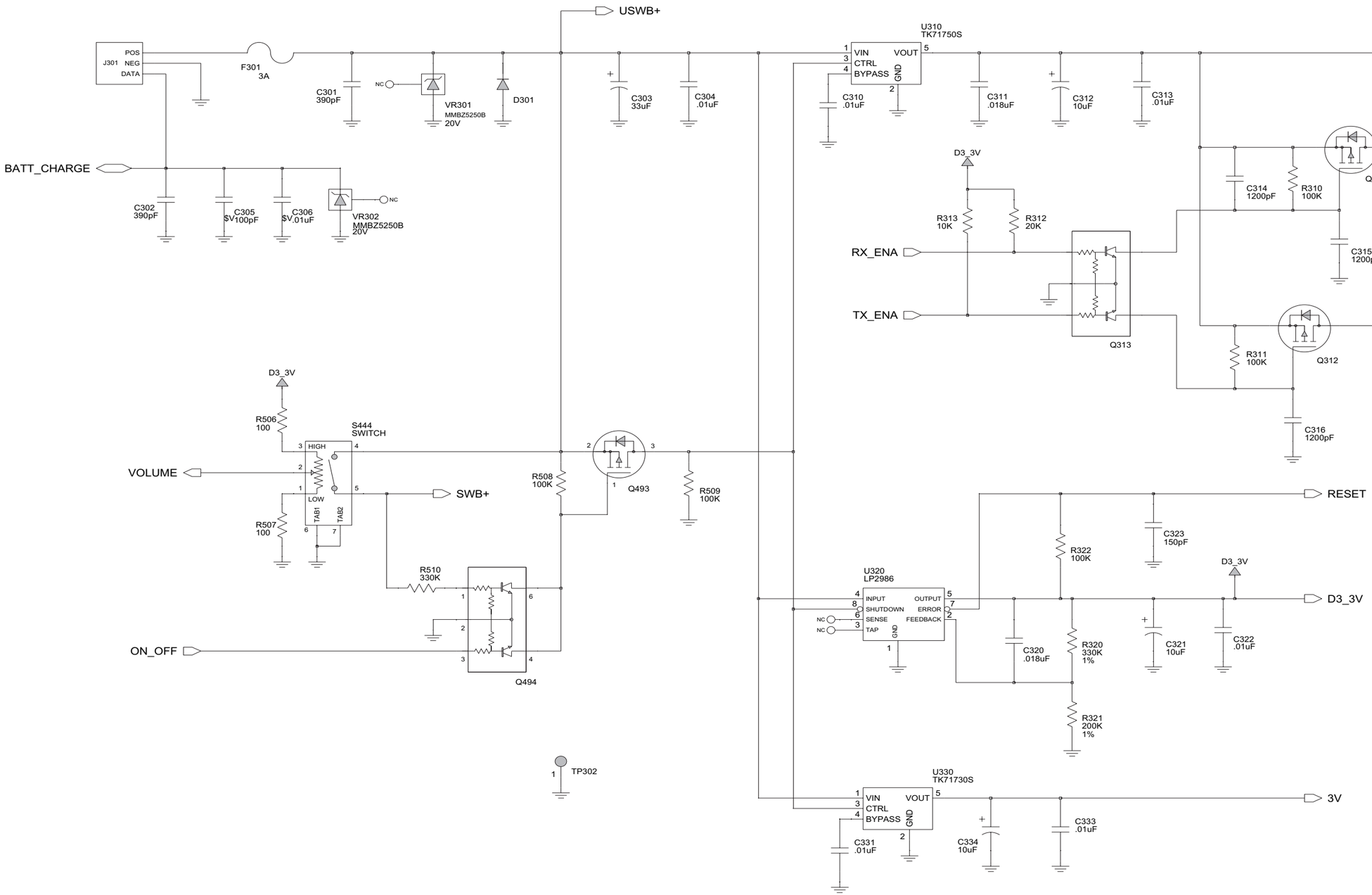


Figure 13-106. UHF (465–495 MHz) DC Regulation Schematic Diagram (8416847H01-A/02-B)

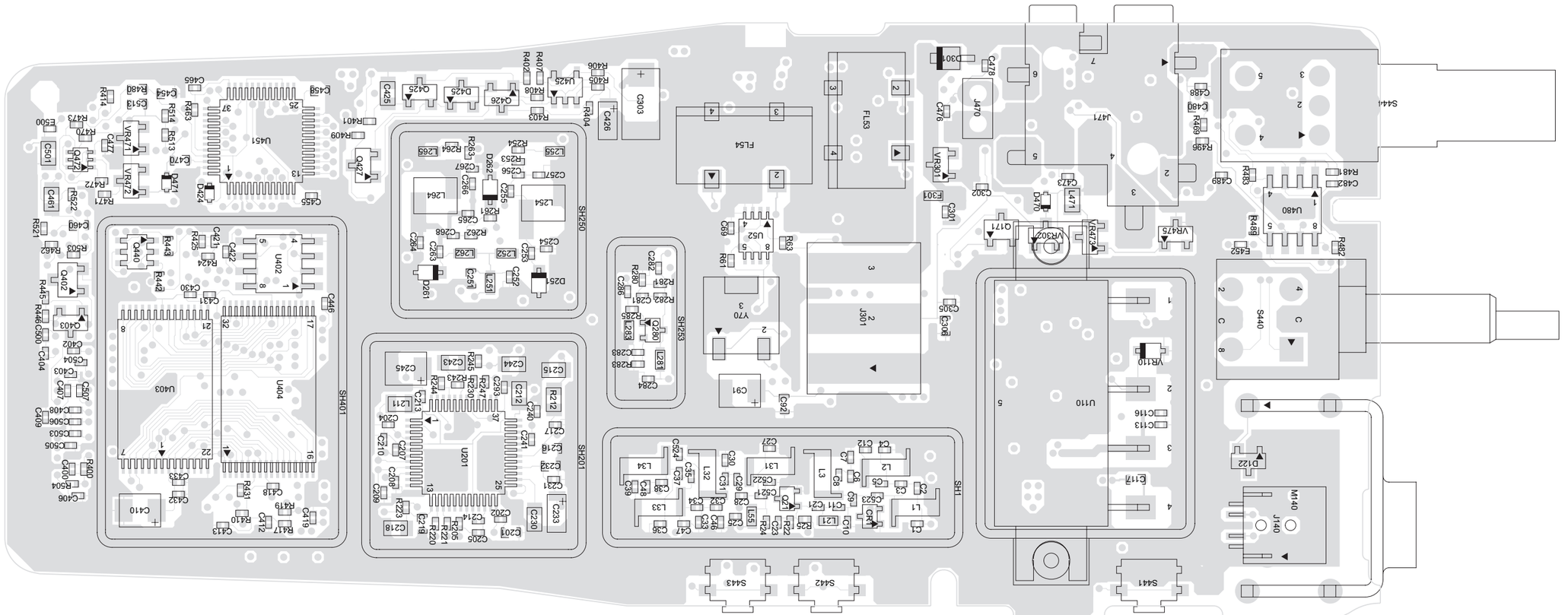


Figure 13-107. UHF (465–495 MHz) Board Component Side View (8416847H01-A/02-B)

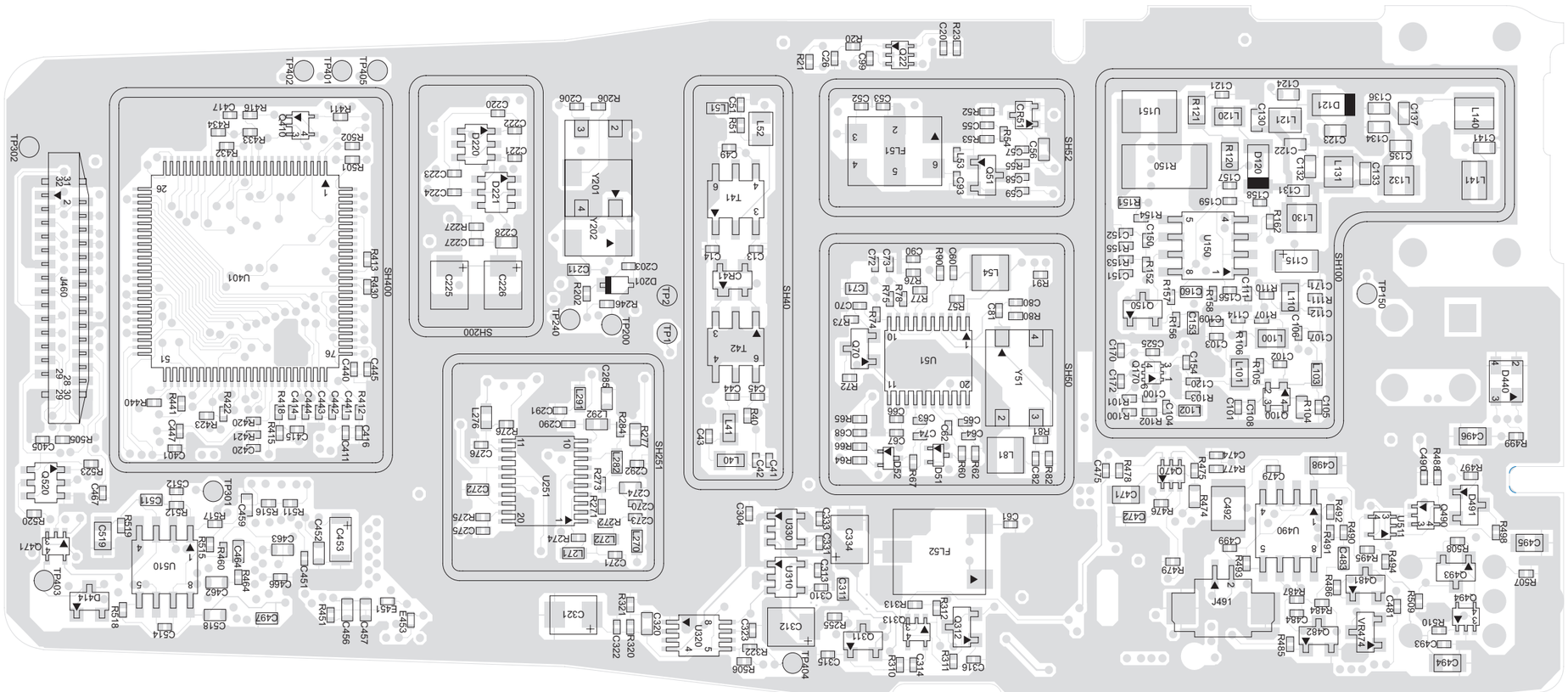


Figure 13-108. UHF (465–495 MHz) Board Solder Side View (8416847H01-A/02-B)

UHF (465–495 MHz) Radio Parts List (8416847H01-A/02-B)

Circuit Ref	Motorola Part No.	Description
C1	2115153H32	CAP, 8 pF
C2	2115153H26	CAP, 9.1 pF
C3	2115153H18	CAP, 4.3 pF
C4	2115153H27	CAP, 10 pF
C5	2115153H31	CAP, 7 pF
C6	2115153H24	CAP, 7.5 pF
C7	2115153H26	CAP, 9.1 pF
C8	2115153H18	CAP, 4.3 pF
C9	2115153H22	CAP, 6.2 pF
C10	2115153H13	CAP, 2.7 pF
C11	2113945A04	CAP, 390 pF
C12	NOT PLACED	64AM DUMMY PART NUMBER
C13	2115153H07	CAP, 1.5 pF
C14	2115153H07	CAP, 1.5 pF
C20	2113945A04	CAP, 390 pF
C21	2115153H53	CAP, 68 pF
C23	2113945A04	CAP, 390 pF
C25	2113945A04	CAP, 390 pF
C26	2113945A04	CAP, 390 pF
C27	2115153H25	CAP, 8.2 pF
C28	2115153H27	CAP, 10 pF
C29	2115153H22	CAP, 6.2 pF
C30	2115153H38	CAP, 16 pF
C31	2115153H21	CAP, 5.6 pF
C32	2115153H22	CAP, 6.2 pF
C33	2115153H42	CAP, 24 pF
C34	2115153H22	CAP, 6.2 pF
C35	2115153H22	CAP, 6.2 pF
C36	2115153H39	CAP, 18 pF
C37	2115153H25	CAP, 8.2 pF
C38	2115153H20	CAP, 5.1 pF
C39	2115153H13	CAP, 2.7 pF
C41	2115153H27	CAP, 10 pF
C42	2115153H25	CAP, 8.2 pF
C43	2115153H40	CAP, 20 pF
C44	2115153H26	CAP, 9.1 pF
C45	2115153H37	CAP, 15 pF
C46	NOT PLACED	64AM DUMMY PART NUMBER
C47	NOT PLACED	64AM DUMMY PART NUMBER
C48	0613952R66	RES, 0
C49	NOT PLACED	64AM DUMMY PART NUMBER
C51	2113944A38	CAP, 82 pF
C52	2115153H41	CAP, 22 pF
C53	2115153H26	CAP, 9.1 pF
C55	2113946K02	CAP, 100000 pF
C56	2113945C31	CAP, 10 uF
C57	2113946K02	CAP, 100000 pF
C58	2113944A15	CAP, 3.9 pF
C59	2113944A11	CAP, 2.7 pF
C60	2113946K02	CAP, 100000 pF
C61	2113944A36	CAP, 68 pF
C62	2113946K02	CAP, 100000 pF
C63	2113946K02	CAP, 100000 pF
C64	2113946K02	CAP, 100000 pF
C65	2113946K02	CAP, 100000 pF
C66	2113946K02	CAP, 100000 pF
C67	2113946K02	CAP, 100000 pF
C68	2113946K02	CAP, 100000 pF
C69	2113946K02	CAP, 100000 pF
C70	2113944A87	CAP, 130 pF
C71	2113945C31	CAP, 10 uF
C72	2113946K02	CAP, 100000 pF
C73	2113945A13	CAP, 4700 pF
C74	2113944A33	CAP, 47 pF
C80	2115153H41	CAP, 22 pF
C81	2115153H45	CAP, 33 pF
C82	2115153H46	CAP, 36 pF
C90	2113946K02	CAP, 100000 pF
C91	2313960D07	CAP, 10uF
C92	2113945C31	CAP, 10 uF
C93	NOT PLACED	64AM DUMMY PART NUMBER
C99	2113946K02	CAP, 100000 pF
C100	2113945A04	CAP, 390 pF
C101	2113946K02	CAP, 100000 pF
C102	2113946K02	CAP, 100000 pF
C103	2113945A04	CAP, 390 pF
C104	2113944A21	CAP, 6.8 pF
C105	NOT PLACED	64AM DUMMY PART NUMBER
C106	2113945A04	CAP, 390 pF
C107	NOT PLACED	64AM DUMMY PART NUMBER
C108	2113945A04	CAP, 390 pF
C109	2113946K02	CAP, 100000 pF
C111	2113945A04	CAP, 390 pF
C112	2113946K02	CAP, 100000 pF
C113	2113945A04	CAP, 390 pF
C114	2113945A04	CAP, 390 pF
C115	2313960B01	CAP, 1 uF
C116	2113946K02	CAP, 100000 pF
C117	2113944C05	CAP, 390 pF
C120	NOT PLACED	64AM DUMMY PART NUMBER
C121	2113945A04	CAP, 390 pF
C122	NOT PLACED	64AM DUMMY PART NUMBER
C123	2113944C20	CAP, 3.9 pF
C124	2113944C05	CAP, 390 pF
C130	2113944C16	CAP, 2.7 pF
C131	NOT PLACED	64AM DUMMY PART NUMBER
C132	2113944C73	CAP, 6.8 pF
C133	NOT PLACED	64AM DUMMY PART NUMBER
C134	2113944C73	CAP, 6.8 pF
C135	NOT PLACED	64AM DUMMY PART NUMBER
C136	2113944C21	CAP, 4.3 pF
C137	2113944C02	CAP, 220 pF
C141	2113944C63	CAP, 1 pF
C150	2113945A04	CAP, 390 pF
C151	2113945A04	CAP, 390 pF
C152	2113945A04	CAP, 390 pF
C153	2113946L04	CAP, 0.47 uF
C154	2113945A04	CAP, 390 pF
C156	2113945B02	CAP, 10000 pF
C157	2113946K02	CAP, 100000 pF
C158	2113945A04	CAP, 390 pF
C159	2113945A04	CAP, 390 pF
C160	2113945C31	CAP, 10 uF
C170	2113945A04	CAP, 390 pF
C171	2113945A04	CAP, 390 pF
C172	2113945A04	CAP, 390 pF
C201	2113944C02	CAP, 220 pF
C202	2115153H52	CAP, 62 pF
C203	2115153H13	CAP, 2.7 pF
C204	2113945A05	CAP, 470 pF
C205	NOT PLACED	64AM DUMMY PART NUMBER
C206	NOT PLACED	64AM DUMMY PART NUMBER
C207	2113945A05	CAP, 470 pF
C208	2113945A05	CAP, 470 pF
C209	2113945A05	CAP, 470 pF
C210	2113945A05	CAP, 470 pF
C211	2113945C31	CAP, 10 uF
C212	2113946N03	CAP, 2.2 uF
C213	2113945B02	CAP, 10000 pF
C214	2113945A09	CAP, 1000 pF
C215	2113946N03	CAP, 2.2 uF
C216	2113945C31	CAP, 10 uF
C217	2113945A09	CAP, 1000 pF
C218	2113946N03	CAP, 2.2 uF
C219	2113945C31	CAP, 10 uF
C220	2113944A29	CAP, 22 pF
C221	2113945B02	CAP, 10000 pF
C222	2113945B02	CAP, 10000 pF
C223	2113945B02	CAP, 10000 pF
C224	2113945B02	CAP, 10000 pF
C225	2313960D07	CAP, 10uF
C226	2313960D07	CAP, 10uF
C227	2113945A09	CAP, 1000 pF
C228	2113945C31	CAP, 10 uF
C230	2113946N03	CAP, 2.2 uF
C231	2113945A09	CAP, 1000 pF
C232	2113945C31	CAP, 10 uF
C233	2313960B30	CAP, 4.7 uF
C240	2115153H06	CAP, 1.3 pF
C241	2113944A40	CAP, 100 pF
C243	0886641Z01	CAP, .1uF
C244	0888600M25	CAP,
C245	2313960C26	CAP, 1 uF
C251	0888600M03	CAP,
C252	NOT PLACED	64AM DUMMY PART NUMBER
C253	2115153H22	CAP, 6.2 pF
C254	2115153H15	CAP, 3.3 pF
C255	2115153H26	CAP, 9.1 pF
C256	2115153H17	CAP, 3.9 pF
C257	2115153H35	CAP, 12 pF
C263	2115153H22	CAP, 6.2 pF
C264	2115153H14	CAP, 3 pF
C265	2115153H21	CAP, 5.6 pF
C266	2115153H14	CAP, 3 pF
C267	2115153H26	CAP, 9.1 pF
C268	2115153H01	CAP, 0.5 pF
C270	2113945A04	CAP, 390 pF
C271	2113945A04	CAP, 390 pF
C272	2113945C31	CAP, 10 uF
C273	2113945B02	CAP, 10000 pF
C274	2113945C31	CAP, 10 uF
C275	2113945A04	CAP, 390 pF
C276	2115153H16	CAP, 3.6 pF
C281	2113945A04	CAP, 390 pF
C282	2115153H18	CAP, 4.3 pF
C283	2113945A04	CAP, 390 pF
C284	2113945A04	CAP, 390 pF
C285	2113945C31	CAP, 10 uF
C286	2115153H17	CAP, 3.9 pF
C290	2115153H23	CAP, 6.8 pF
C291	2115153H36	CAP, 13 pF
C292	2113945A04	CAP, 390 pF
C293	2113945A05	CAP, 470 pF
C301	2113944A33	CAP, 47 pF
C302	2113945A04	CAP, 390 pF
C303	2313960F04	CAP, 33 uF

Circuit Ref	Motorola Part No.	Description
C304	2113945B02	CAP, 10000 pF
C305	2113944A40	CAP, 100 pF
C306	2113945L49	CAP, 10000 pF
C310	2113945B02	CAP, 10000 pF
C311	2113945C21	CAP, 18 uF
C312	2313960D07	CAP, 10uF
C313	2113945B02	CAP, 10000 pF
C314	2113945A60	CAP, 1200 pF
C315	2113945A60	CAP, 1200 pF
C316	2113945A60	CAP, 1200 pF
C320	2113945C21	CAP, 18 uF
C321	2313960D07	CAP, 10uF
C322	2113945B02	CAP, 10000 pF
C323	2113944A42	CAP, 150 pF
C331	2113945B02	CAP, 10000 pF
C333	2113945B02	CAP, 10000 pF
C334	2313960D07	CAP, 10uF
C400	NOT PLACED	64AM DUMMY PART NUMBER
C401	2113946K02	CAP, 100000 pF
C402	2113945A09	CAP, 1000 pF
C403	2113944A40	CAP, 100 pF
C404	2113945A09	CAP, 1000 pF
C405	2113944A40	CAP, 100 pF
C406	2113944A40	CAP, 100 pF
C407	2113945A09	CAP, 1000 pF
C408	2113945A09	CAP, 1000 pF
C409	2113945A09	CAP, 1000 pF
C410	2313960D07	CAP, 10uF
C411	2113946K02	CAP, 100000 pF
C412	2113945A09	CAP, 1000 pF
C413	2113946K02	CAP, 100000 pF
C414	2113946K02	CAP, 100000 pF
C415	2113945A09	CAP, 1000 pF
C416	2113945A09	CAP, 1000 pF
C417	2113945A09	CAP, 1000 pF
C418	2113946K02	CAP, 100000 pF
C419	2113945A09	CAP, 1000 pF
C420	2113945B02	CAP, 10000 pF
C421	2113945B02	CAP, 10000 pF
C422	2113945B02	CAP, 10000 pF
C425	2113946E02	CAP, 1 uF
C426	2313960B01	CAP, 1 uF
C430	2113946K02	CAP, 100000 pF
C431	2113945A09	CAP, 1000 pF
C432	2113946K02	CAP, 100000 pF
C433	2113945A09	CAP, 1000 pF
C440	2113945B02	CAP, 10000 pF
C441	2113945B02	CAP, 10000 pF
C442	2113945B02	CAP, 10000 pF
C443	2113945B02	CAP, 10000 pF
C444	2113945B02	CAP, 10000 pF
C445	2113945B02	CAP, 10000 pF
C446	2113945B02	CAP, 10000 pF
C447	2113946K02	CAP, 100000 pF
C451	2113946K02	CAP, 100000 pF
C452	2185895Z01	CAP, 1 uF
C453	2313960B30	CAP, 4.7 uF
C454	2113945C31	CAP, 10 uF
C455	2113945B04	CAP, 22000 pF
C456	2113945C31	CAP, 10 uF
C457	2113945C31	CAP, 10 uF
C458	2113945C31	CAP, 10 uF
C459	2113945C31	CAP, 10 uF
C460	2113945C31	CAP, 10 uF
C461	2113946F03	CAP, 4.7 uF
C462	2113945C31	CAP, 10 uF
C463	2113945C31	CAP, 10 uF
C464	2113945C31	CAP, 10 uF
C465	2113945A09	CAP, 1000 pF
C466	NOT PLACED	64AM DUMMY PART NUMBER
C467	2113945A60	CAP, 1200 pF
C470	2113945C31	CAP, 10 uF
C471	2113946N03	CAP, 2.2 uF
C472	2113945C31	CAP, 10 uF
C473	2113944A42	CAP, 150 pF
C474	2113944A42	CAP, 150 pF
C475	2113945B04	CAP, 22000 pF
C476	2113945B04	CAP, 22000 pF
C477	2113946K02	CAP, 100000 pF
C478	2113944A42	CAP, 150 pF
C479	2113944A42	CAP, 150 pF
C480	2113945C31	CAP, 10 uF
C481	NOT PLACED	64AM DUMMY PART NUMBER
C482	NOT PLACED	64AM DUMMY PART NUMBER
C483	2113945C31	CAP, 10 uF
C484	NOT PLACED	64AM DUMMY PART NUMBER
C488	2113945A05	CAP, 470 pF
C489	2113945A05	CAP, 470 pF
C490	2113945A05	CAP, 470 pF
C492	2113955E37	CAP, 10 uF
C493	2113945A09	CAP, 1000 pF
C494	2113946N03	CAP, 2.2 uF
C495	2113946N02	CAP, 1 uF
C496	2113946N02	CAP, 1 uF
C497	2113945C31	CAP, 10 uF
C498	2113946N02	CAP, 1 uF
C499	2113944A38	CAP, 82 pF
C500	2113945A09	CAP, 1000 pF
C501	2113946N02	CAP, 1 uF
C503	2113945A09	CAP, 1000 pF
C504	2113945A09	CAP, 1000 pF
C505	2113945A09	CAP, 1000 pF
C506	2113945A09	CAP, 1000 pF
C507	2113945A09	CAP, 1000 pF
C511	2113944C02	CAP, 220 pF
C512	2113944A21	CAP, 6.8 pF
C513	2113944C02	CAP, 220 pF
C514	2113944A79	CAP, 16 pF
C518	2113945C31	CAP, 10 uF
C519	2113946N02	CAP, 1 uF
C521	2115153H13	CAP, 2.7 pF
C522	2113944A61	CAP, 0.5 pF
C523	2186463Z03	CAP, 0.5 uF
C524	2186463Z03	CAP, 0.5 uF
C525	2113945A04	CAP, 390 pF
CR1	4813974A19	DIODE SCHOTTKY
CR41	4815923H01	DIODE SCHOTTKY
CR51	4813974A19	DIODE SCHOTTKY
D51	4815047H01	DIODE SWITCHING
D52	4815047H01	DIODE SWITCHING
D120	4880973Z02	PIN DIODE
D121	4880973Z02	PIN DIODE
D122	4813978C06	DIODE SWITCHING
D201	4815072H01	DIODE VARACTOR
D220	4815011H01	DIODE TRIPLE
D221	4815011H01	DIODE TRIPLE
D251	4885055Y01	DIODE VARACTOR
D261	4885055Y01	DIODE VARACTOR
D262	4885055Y01	DIODE VARACTOR
D301	4815713H01	DIODE SCHOTTKY
D414	4805129M41	DIODE SCHOTTKY
D424	4809924D29	DIODE HIGH VOLTAGE
D425	4805129M41	DIODE SCHOTTKY
D440	4805729G49	DIODE RED/YEL
D470	4809924D29	DIODE HIGH VOLTAGE
D471	4809924D29	DIODE HIGH VOLTAGE
D491	NOT PLACED	64AM DUMMY PART NUMBER
E451	2480640Z01	FERRITE BEAD
E452	2480640Z01	FERRITE BEAD
E453	2480640Z01	FERRITE BEAD
E500	2480640Z01	FERRITE BEAD
F301	6515076H01	FUSE SMT
FL51	9186801Z01	CRYSTAL OSC 44.85MHZ
FL52	9180468V04	4 ELEMENT FLTR
FL53	9115811H03	6 ELEMENT FLTR
FL54	9115811H01	6 ELEMENT FLTR
J140	0986428Z02	JACK, RF
J301	0986565Z02	BATTERY CONNECTOR
J460	NOT PLACED	64AM DUMMY PART NUMBER
J470	0985818A02	CONN 2 PIN
J471	0980683Z03	AUDIO JACK
J491	2815162H01	CONN 1.25MM
L1	2415428H08	IND, 9.85 NH
L2	2415428H08	IND, 9.85 NH
L3	2415428H08	IND, 9.85 NH
L21	2414017N18	IND, 33 NH
L31	2415428H08	IND, 9.85 NH
L32	2415428H08	IND, 9.85 NH
L33	2415428H08	IND, 9.85 NH
L34	2415428H08	IND, 9.85 NH
L40	2414017K16	IND, 27 NH
L41	2414017K16	IND, 27 NH
L51	2414017N26	IND, 150 NH
L52	2414032F43	IND, 560 NH
L53	2113944A41	CAP, 120 pF
L54	2414015A25	IND, 1200 NH
L55	2414017N16	IND, 22 NH
L81	2414015A19	IND, 1000 NH
L100	2414017K27	IND, 220 NH
L101	2414017K27	IND, 220 NH
L102	2415429H11	IND, 7.5 NH
L103	2415429H08	IND, 5.1 NH
L110	2414017K27	IND, 220 NH
L120	2414017K27	IND, 220 NH
L121	2414032F24	IND, 15 NH
L130	2460591C36	IND, 20.45 NH
L131	2460591C40	IND, 17.02 NH
L132	2460591C40	IND, 17.02 NH
L140	2460591L14	IND, 15.92 NH
L141	2479990M01	IND, 31 NH NH
L211	2414017K30	IND, 390 NH
L251	2414017N28	IND, 220 NH
L252	2414017N17	IND, 27 NH
L254	2415385H02	IND, 12.5 NH
L255	2414017N28	IND, 220 NH
L262	2414017N17	IND, 27 NH
L264	2415385H01	IND, 8.0 NH
L265	2414017N28	IND, 220 NH
L270	2414017N28	IND, 220 NH
L271	NOT PLACED	64AM DUMMY PART NUMBER
L272	2414017N28	IND, 220 NH
L276	2414017N17	IND, 27 NH
L281	2414017N15	IND, 18 NH
L282	2414017N15	IND, 18 NH
L283	NOT PLACED	64AM DUMMY PART NUMBER

Circuit Ref	Motorola Part No.	Description
L291	2414017N10	IND, 6.8 NH
L292	2414017N14	IND, 15 NH
L471	2414017K30	IND, 390 NH
M140	0286427Z02	NUT, ANTENNA
Q21	4802247J01	BJT, RF AMP, BFS505
Q22	4815267H01	TRANS DUAL PNP
Q51	4802197J95	RF TRANSISTOR
Q70	4813973M07	TSTR MMBT3904
Q100	4885593U03	TSTR NPN BFG540W
Q150	4813973M07	TSTR MMBT3904
Q170	4809939C34	TSTR DUAL PNP
Q171	4813973A42	TSTR NPN DIG
Q280	4802245J95	BJT, NPN TRANSISTOR
Q311	4815069H02	TSTR MOSFET P-CHAN
Q312	4815069H02	TSTR MOSFET P-CHAN
Q313	4815066H01	DIGITAL TRANSISTOR
Q402	4813973A42	TSTR NPN DIG
Q403	4813973A13	XSTR PNP40V
Q410	4815066H01	DIGITAL TRANSISTOR
Q425	4815069H02	TSTR MOSFET P-CHAN
Q426	4815069H02	TSTR MOSFET P-CHAN
Q427	4815069H02	TSTR MOSFET P-CHAN
Q440	4815154H01	DUAL TRANS NPNS
Q470	4815267H01	TRANS DUAL PNP
Q471	4815066H01	DIGITAL TRANSISTOR
Q472	4815267H01	TRANS DUAL PNP
Q481	NOT PLACED	64AM DUMMY PART NUMBER
Q482	NOT PLACED	64AM DUMMY PART NUMBER
Q490	4815066H01	DIGITAL TRANSISTOR
Q493	4815069H02	TSTR MOSFET P-CHAN
Q494	4815066H01	DIGITAL TRANSISTOR
Q520	4815154H01	DUAL TRANS NPNS
R20	0613952Q91	RES, 5600
R21	0613952Q48	RES, 91
R22	0613952Q91	RES, 5600
R23	0613952R11	RES, 27K
R24	0613952Q75	RES, 1200
R25	0613952Q91	RES, 5600
R40	0613952Q73	RES, 1000
R51	0613952Q42	RES, 51
R52	0613952R03	RES, 12K
R53	0613952R13	RES, 33K
R54	0613952Q90	RES,5100
R55	0613952Q61	RES, 330
R57	0613952Q89	RES, 4700
R60	0613952Q82	RES, 2400
R61	0613952R25	RES, 100K
R62	0613952Q85	RES, 3300
R63	0613952R15	RES, 39K
R64	0613952R08	RES, 20K
R65	0613952R15	RES, 39K
R66	0613952R08	RES, 20K
R67	0613952R08	RES, 20K
R72	0613952Q63	RES, 390
R73	0613952Q79	RES, 1800
R74	0613952Q75	RES, 1200
R75	0613952R03	RES, 12K
R76	0613952Z55	RES, 12K
R77	0613952Z53	RES, 8.2K
R78	0613952Q69	RES, 680
R80	0613952Q90	RES,5100
R81	0613952Q73	RES, 1000
R82	NOT PLACED	64AM DUMMY PART NUMBER
R90	0613952Q42	RES, 51
R91	0613952Q78	RES, 1600
R100	0613952Q71	RES,820
R101	0613952Q19	RES, 5.6
R102	0613952Q71	RES,820
R103	0613952Q84	RES, 3000
R104	0613952H31	RES, 18
R105	0613952Q83	RES, 2700
R106	0613952Q89	RES, 4700
R107	NOT PLACED	64AM DUMMY PART NUMBER
R110	0613952Q69	RES, 680
R111	0613952Q80	RES, 2000
R120	0613958H53	RES, 150
R121	0613958H53	RES, 150
R150	0680539Z01	RESISTOR, METAL STRIP
R151	0613952H39	RES, 39
R152	0613952P01	RES, 100K
R153	0613952P01	RES, 100K
R154	0613952P01	RES, 100K
R155	0613952P01	RES, 100K
R156	0613952Q61	RES, 330
R157	0613952Q81	RES, 2200
R158	0613952Q77	RES, 1500
R162	0613952R01	RES, 10K
R202	0613952R29	RES, 150K
R205	0613952Q49	RES, 100
R206	NOT PLACED	64AM DUMMY PART NUMBER
R212	0613958J74	RES, 0 50
R220	0613952Q33	RES, 22
R221	0613952Q33	RES, 22
R223	0613952Q49	RES, 100
R227	0613952R15	RES, 39K
R230	0613952R08	RES, 20K
R243	0613952Q71	RES,820
R244	0613952Q42	RES, 51
R245	0613952Q77	RES, 1500
R246	0613952R25	RES, 100K
R247	0613952R07	RES, 18K
R253	0613952Q41	RES, 47
R254	0613952Q49	RES, 100
R255	0613952Z46	RES, 3.9K
R261	0613952R09	RES, 22K
R262	0613952Q94	RES, 7500
R263	0613952Q37	RES, 33
R264	0613952Q49	RES, 100
R271	0613952Q92	RES, 6200
R272	0613952Q92	RES, 6200
R273	0613952Q61	RES, 330
R274	0613952Q37	RES, 33
R275	0613952Q49	RES, 100
R276	NOT PLACED	64AM DUMMY PART NUMBER
R277	0613952G67	RES, 0
R280	0613952Q89	RES, 4700
R281	0613952Q95	RES, 8200
R282	0613952Q72	RES, 910
R283	0613952Q52	RES, 130
R284	0613952Q69	RES, 680
R285	0613952R66	RES, 0
R310	0613952R25	RES, 100K
R311	0613952R25	RES, 100K
R312	0613952R08	RES, 20K
R313	0613952R01	RES, 10K
R320	0613952Z80	RES, 330K
R321	0613952P30	RES, 200K
R322	0613952R25	RES, 100K
R400	NOT PLACED	64AM DUMMY PART NUMBER
R401	0613952R36	RES, 300K
R402	0613952R01	RES, 10K
R403	0613952R01	RES, 10K
R404	0613952R18	RES, 51K
R405	0613952R36	RES, 300K
R406	0613952R33	RES, 220K
R407	0613952R25	RES, 100K
R408	0613952R25	RES, 100K
R409	0613952Q73	RES, 1000
R410	0613952R01	RES, 10K
R411	0613952Q71	RES,820
R412	0613952R25	RES, 100K
R413	0613952R25	RES, 100K
R414	0613952R13	RES, 33K
R415	0613952R13	RES, 33K
R416	0613952R08	RES, 20K
R417	0613952R01	RES, 10K
R418	0613952R25	RES, 100K
R419	0613952Q89	RES, 4700
R420	0613952P30	RES, 200K
R421	0613952P01	RES, 100K
R422	0613952R25	RES, 100K
R423	0613952R25	RES, 100K
R424	0613952P30	RES, 200K
R425	0613952P01	RES, 100K
R430	0613952R25	RES, 100K
R431	NOT PLACED	64AM DUMMY PART NUMBER
R432	0613952R66	RES, 0
R433	0613952R25	RES, 100K
R434	NOT PLACED	64AM DUMMY PART NUMBER
R440	0613952Q89	RES, 4700
R441	0613952Q89	RES, 4700
R442	0613952H57	RES, 220
R443	0613952H51	RES, 120
R445	0613952Q89	RES, 4700
R446	0613952R01	RES, 10K
R451	0613952R17	RES, 47K
R460	0613952R10	RES, 24K
R462	0613952R10	RES, 24K
R463	0613952R10	RES, 24K
R464	0613952R12	RES, 30K
R469	0613952Q25	RES, 10
R470	0613952Q81	RES, 2200
R471	0613952Q81	RES, 2200
R472	0613952Q69	RES, 680
R473	0613952Q69	RES, 680
R474	0613952H61	RES, 330
R475	0613952R31	RES, 180K
R476	0613952R25	RES, 100K
R477	0613952Q81	RES, 2200
R478	0613952Q81	RES, 2200
R479	0613952R25	RES, 100K
R480	0613952G67	RES, 0
R481	NOT PLACED	64AM DUMMY PART NUMBER
R482	NOT PLACED	64AM DUMMY PART NUMBER
R483	NOT PLACED	64AM DUMMY PART NUMBER
R484	NOT PLACED	64AM DUMMY PART NUMBER
R485	NOT PLACED	64AM DUMMY PART NUMBER
R486	NOT PLACED	64AM DUMMY PART NUMBER
R487	0613952R66	RES, 0

Circuit Ref	Motorola Part No.	Description
R488	0613952R37	RES, 330K
R489	NOT PLACED	64AM DUMMY PART NUMBER
R490	NOT PLACED	64AM DUMMY PART NUMBER
R491	0613952R66	RES, 0
R492	0613952R10	RES, 24K
R493	0613952R37	RES, 330K
R494	0613952Z80	RES, 330K
R495	0613952Q91	RES, 5600
R496	NOT PLACED	64AM DUMMY PART NUMBER
R497	NOT PLACED	64AM DUMMY PART NUMBER
R498	NOT PLACED	64AM DUMMY PART NUMBER
R499	NOT PLACED	64AM DUMMY PART NUMBER
R501	0613952Q49	RES, 100
R502	0613952Q49	RES, 100
R503	0613952Q49	RES, 100
R504	0613952Q49	RES, 100
R505	0613952Q49	RES, 100
R506	0613952Q49	RES, 100
R507	0613952Q49	RES, 100
R508	0613952R25	RES, 100K
R509	0613952R25	RES, 100K
R510	0613952R37	RES, 330K
R511	0613952R25	RES, 100K
R512	0613952R29	RES, 150K
R513	0613952R25	RES, 100K
R514	0613952R25	RES, 100K
R515	0613952R66	RES, 0
R516	NOT PLACED	64AM DUMMY PART NUMBER
R517	NOT PLACED	64AM DUMMY PART NUMBER
R518	0613952R33	RES, 220K
R519	0613952R25	RES, 100K
R520	0613952R25	RES, 100K
R521	NOT PLACED	64AM DUMMY PART NUMBER
R522	0613952R25	RES, 100K
R523	0613952R01	RES, 10K
S440	4080710Z34	FREQUENCY SWITCH 4CH
	4080710Z25	FREQUENCY SWITCH 16 CH
S441	4070354A01	LIGHT TOUCH SWITCH
S442	4070354A01	LIGHT TOUCH SWITCH
S443	4070354A01	LIGHT TOUCH SWITCH
S444	1880619Z04	POTENTIOMETER

Circuit Ref	Motorola Part No.	Description
SH1	2686421Z02	SHIELD, FRONT END
SH40	2686419Z02	SHIELD, MIXER
SH50	2686423Z02	SHIELD, FRAC N
SH52	2686424Z02	SHIELD, INTERMEDIATE FREQ
SH100	2686418Z02	SHIELD, HARMONIC FILTER
SH200	2686424Z02	SHIELD, INTERMEDIATE FREQ
SH201	2686423Z02	SHIELD, FRAC N
SH250	2686425Z02	SHIELD, VCO
SH251	2686425Z02	SHIELD, VCO
SH253	2686422Z02	SHIELD, BUFFER
SH400	2686420Z03	SHIELD, CONTROL
SH401	2686420Z03	SHIELD, CONTROL
T41	2515121H01	BALUN TRANSFORMER
T42	2515121H01	BALUN TRANSFORMER
U51	5115281H01	FM IF IC
U52	5115070H01	IC 3-INV LMOS
U110	0186438Z06	UHF PA MODULE
U150	5114005A01	IC SING SPLY LM2904DR
U151	2415954H02	INDUCTOR BEAD
U201*	5185177Y01	IC TESTED AT25016
U251	5105750U56	VCO BuFFER IC
U310	5115746H01	VOL REGULATOR 5V
U320	5115679H01	IC VLTG REGLTR
U330	5115745H01	VOL REGULATOR 3V
U401*	5185143E03	68HC11FLO_PASS5
U402*	5115033H01	IC, EEPROM, 128
U403	NOT PLACED	64AM DUMMY PART NUMBER
U404*	5115037H01	4M FLASH ROM IC
U425	5115697H01	LOW PWR OP AMP
U451	5115062H01	IC ASFIC_CMP_R1
U480	NOT PLACED	64AM DUMMY PART NUMBER
U490	5116029H01	AUDIO AMPLIFIER
U510	5114005A01	IC SING SPLY LM2904DR
U511	4815066H01	DIGITAL TRANSISTOR
VR110	4813977A59	DIODE ZENER
VR301	4813977M29	DIODE 20V
VR302	4813977M29	DIODE 20V
VR471	4813977M14	DIODE 6.8V
VR472	4813977M05	DIODE 3.3V
VR473	4813977M29	DIODE 20V
VR474	4813977M29	DIODE 20V
VR475	4813977M24	DIODE ZENER
Y51	4802245J84	XTAL 44.395MHz
Y70	9186145B02	CER.DISCR.
Y201*	4880114R08	CRYSTAL 16.8MHZ
Y202	NOT PLACED	64AM DUMMY PART NUMBER

Circuit Ref	Motorola Part No.	Description
	5480678Z01	LABEL BARCODE
	8416847H01	ELP EPP U3 PCB

* Motorola Depot Servicing only

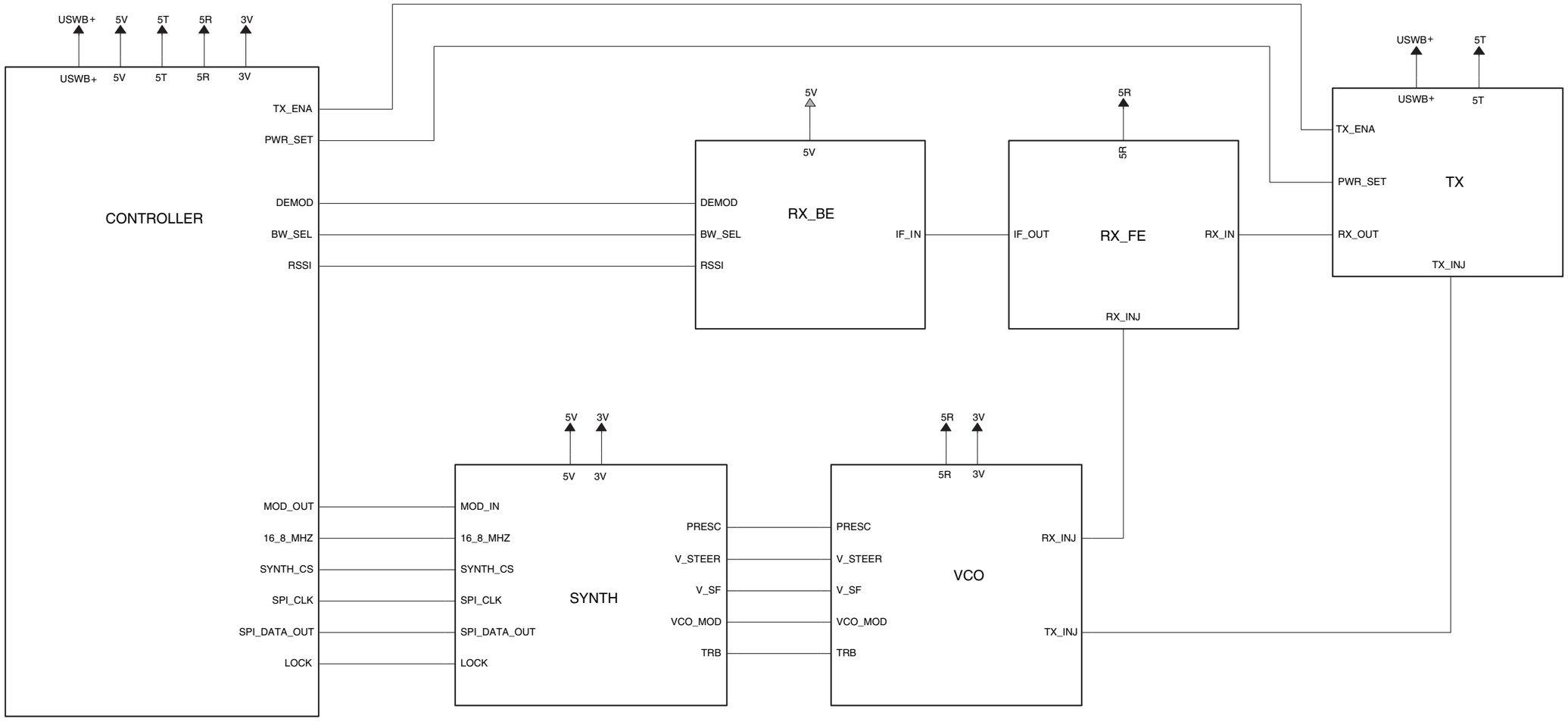


Figure 13-109. UHF (490–527 MHz) Radio Circuit Block Diagram (8486768Z02-A)

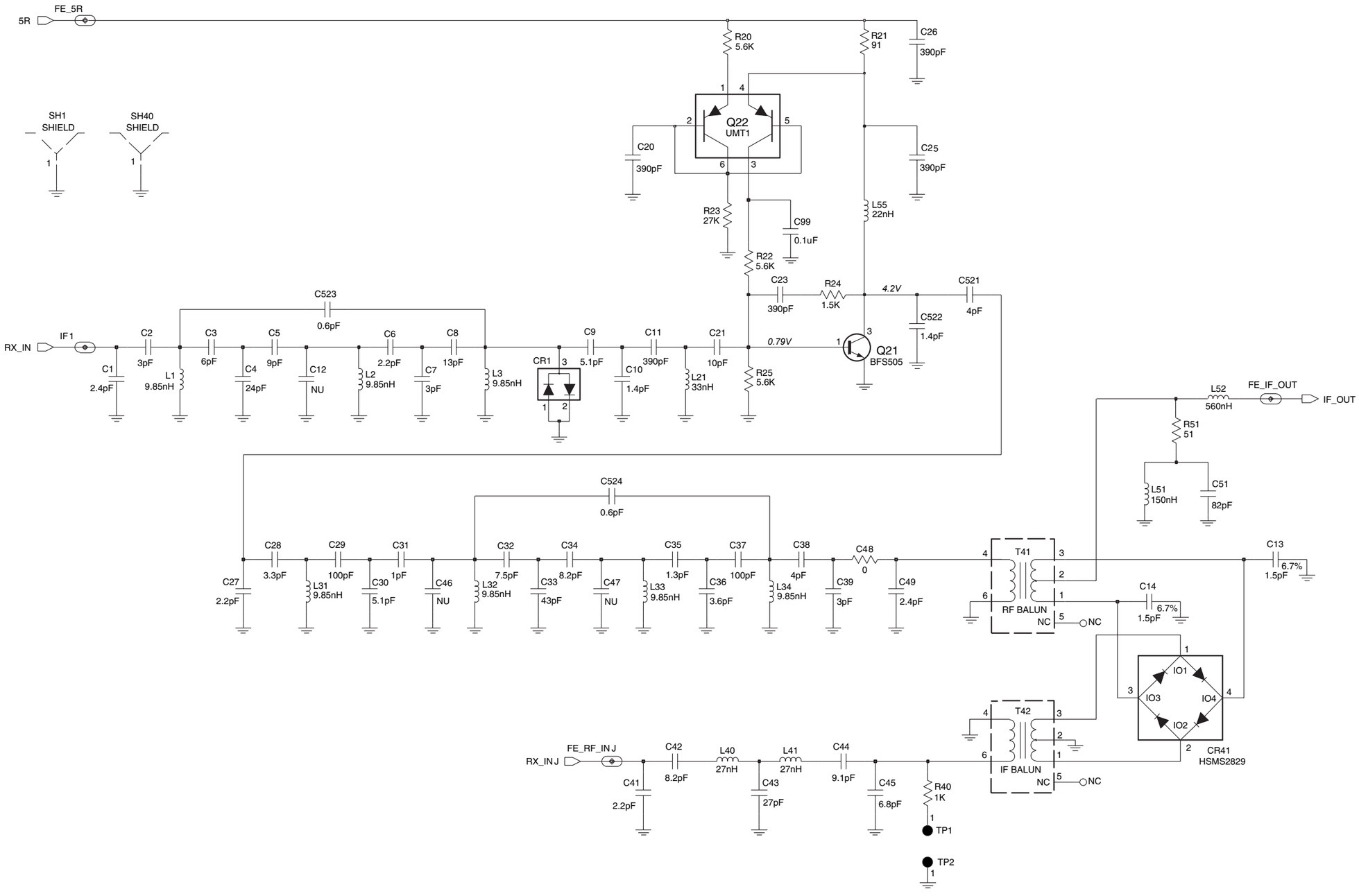


Figure 13-110. UHF (490–527 MHz) Receiver Front End Schematic Diagram (8486768Z02-A)

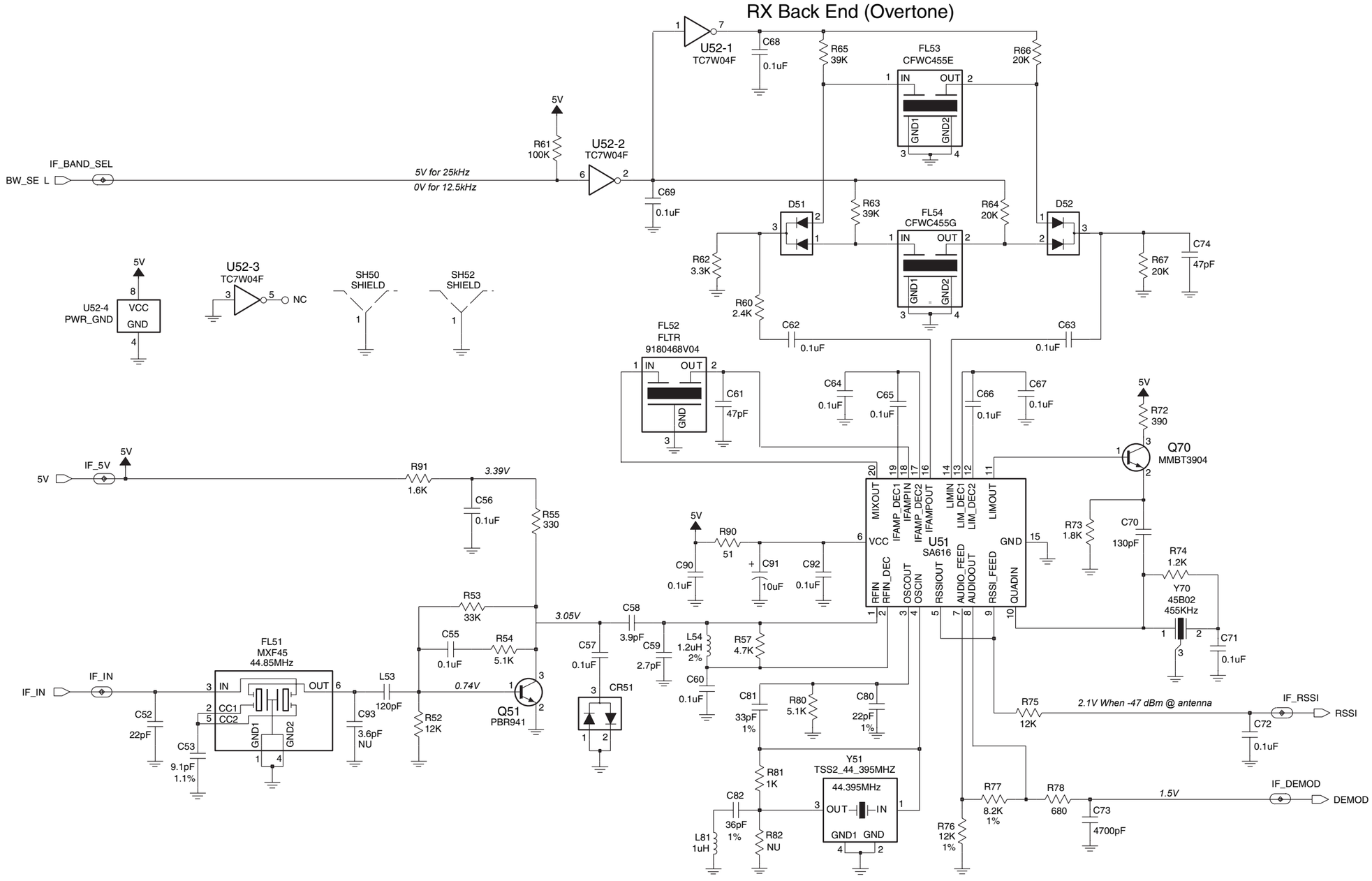
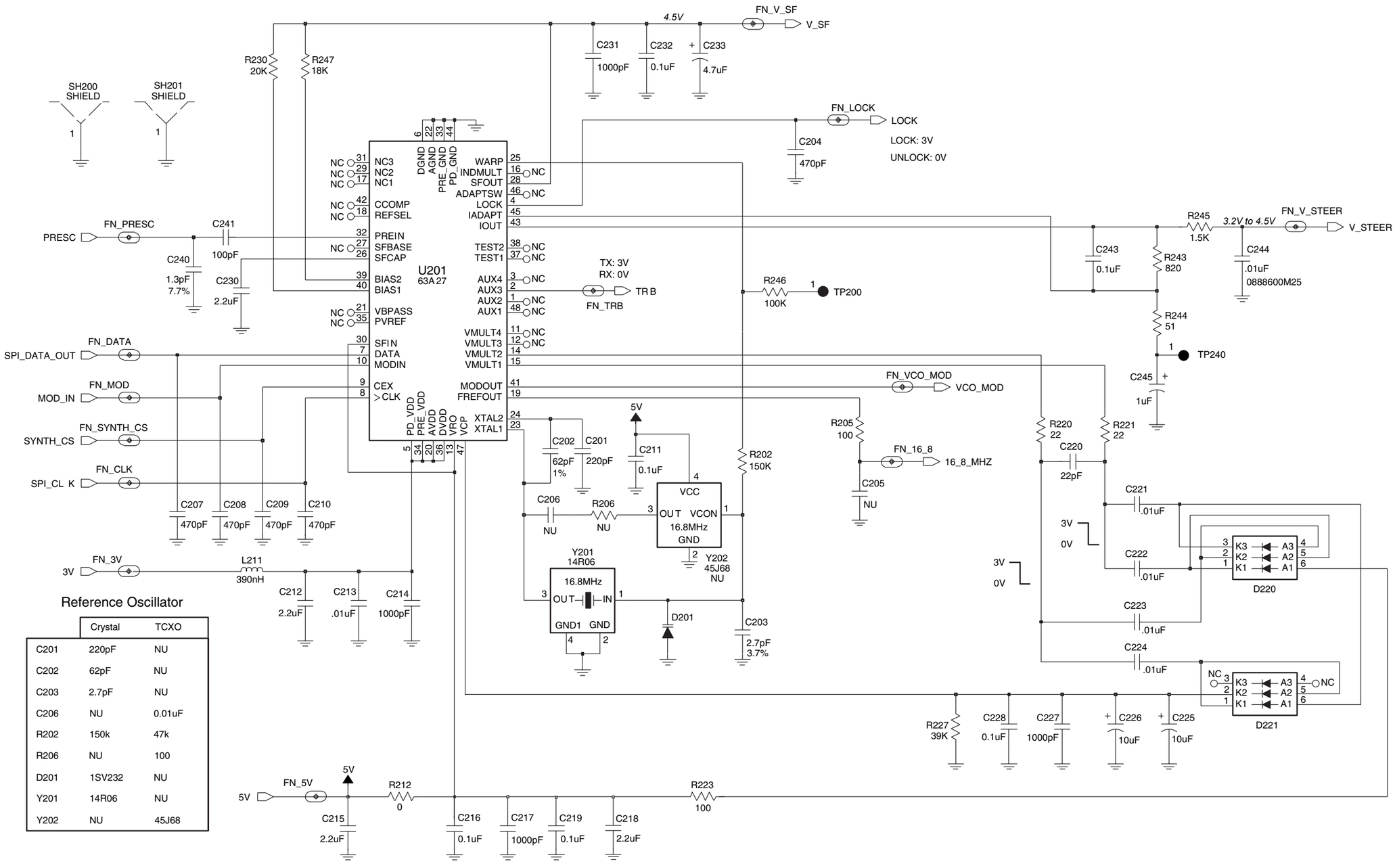


Figure 13-111. UHF (490–527 MHz) Receiver Back End Schematic Diagram (8486768Z02-A)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 13-112. UHF (490–527 MHz) Synthesizer Schematic Diagram (8486768Z02-A)

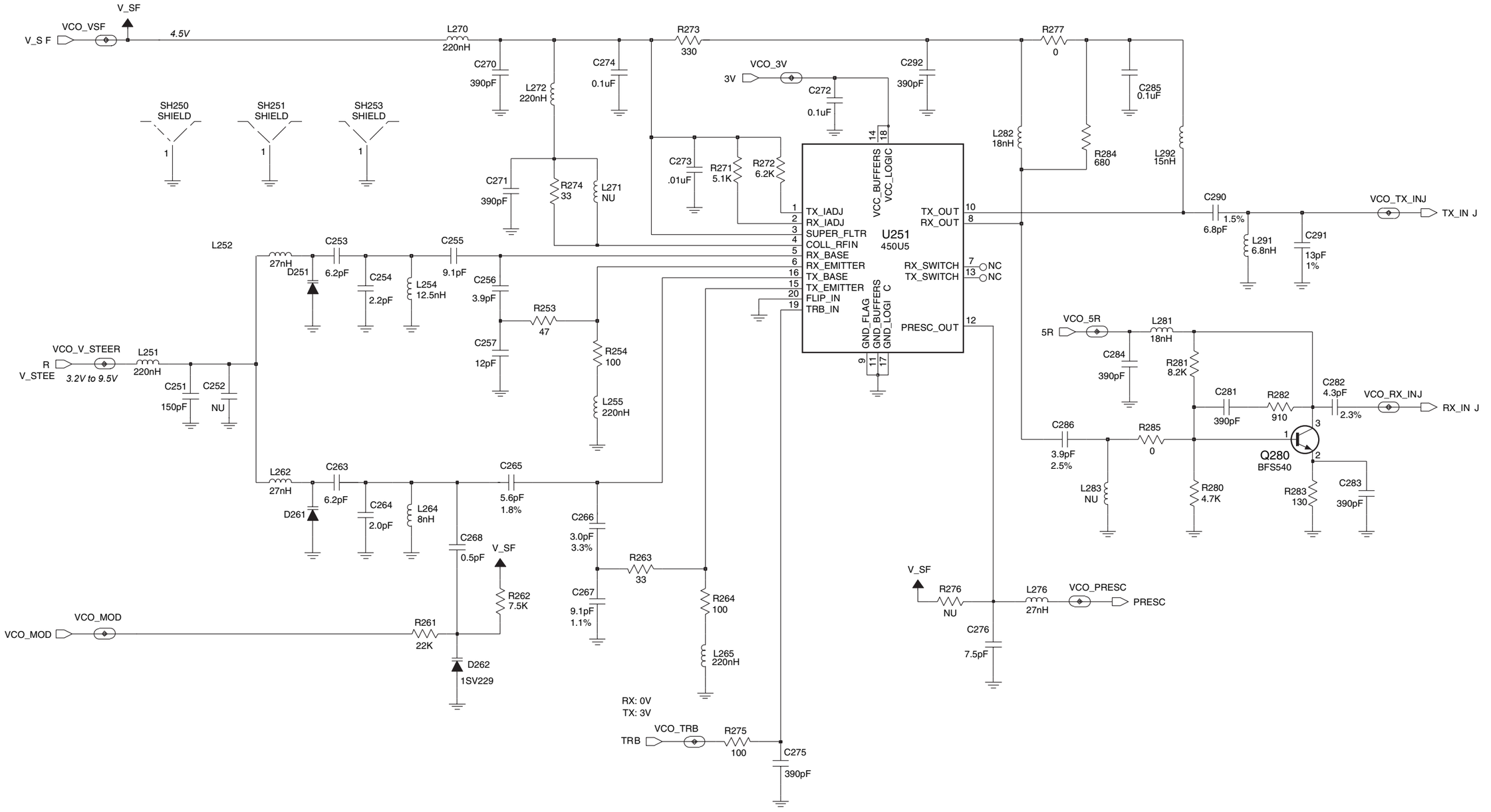


Figure 13-113. UHF (490–527 MHz) Voltage Controlled Oscillator Schematic Diagram (8486768Z02-A)

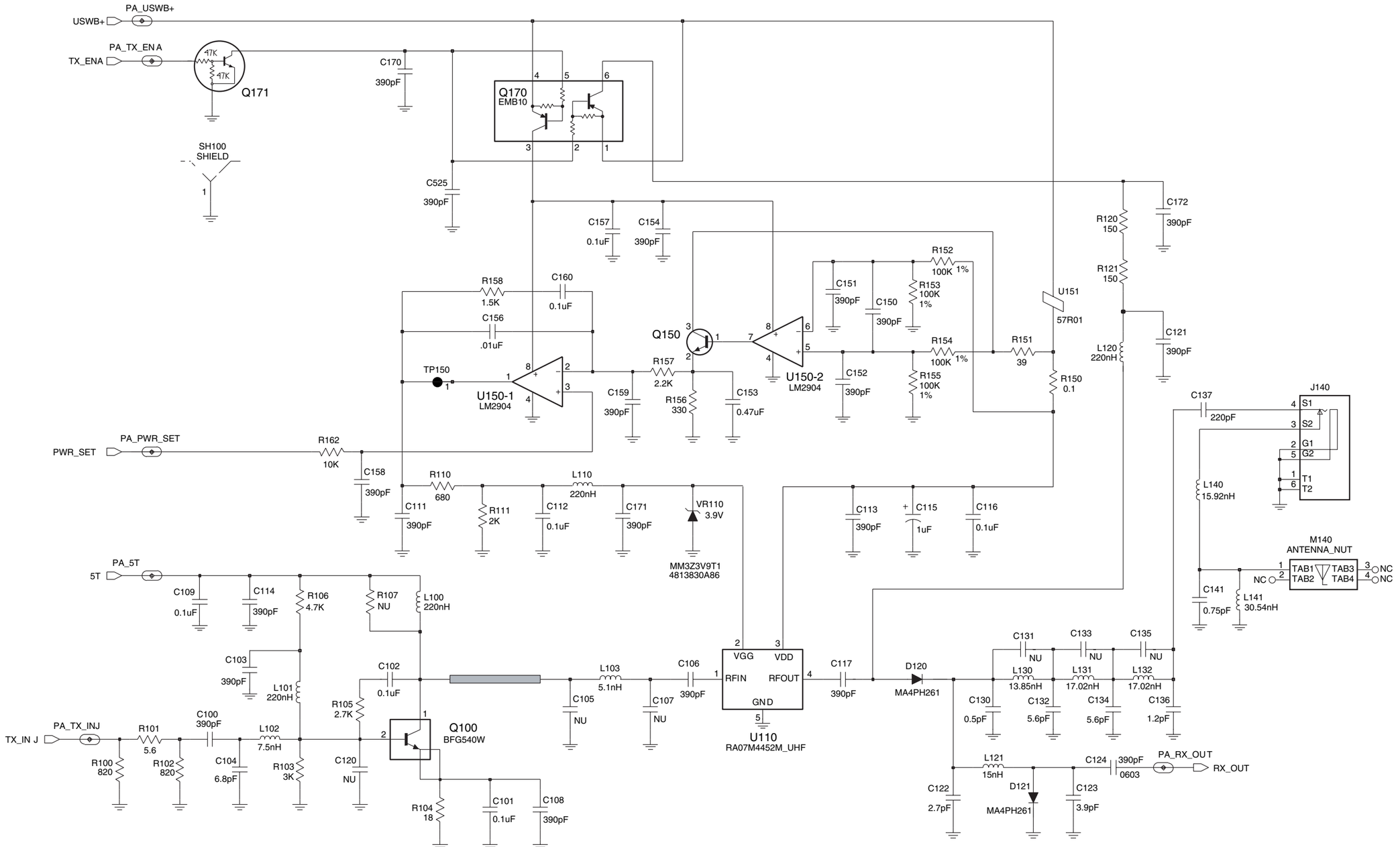


Figure 13-114. UHF (490–527 MHz) Transmitter and Power Control Schematic Diagram (8486768Z02-A)

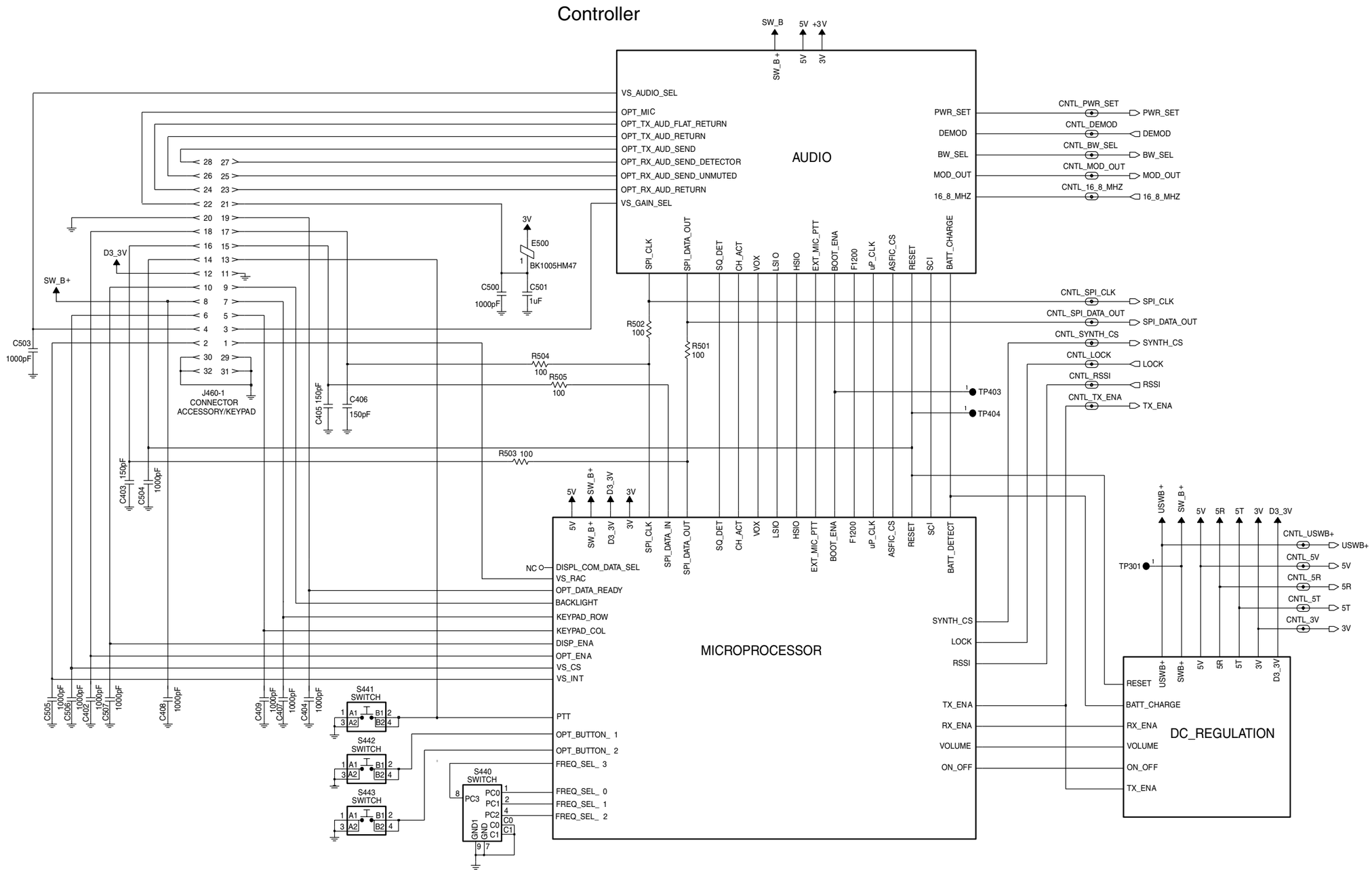


Figure 13-115. UHF (490–527 MHz) Controller Interconnect Schematic Diagram (8486768Z02-A)

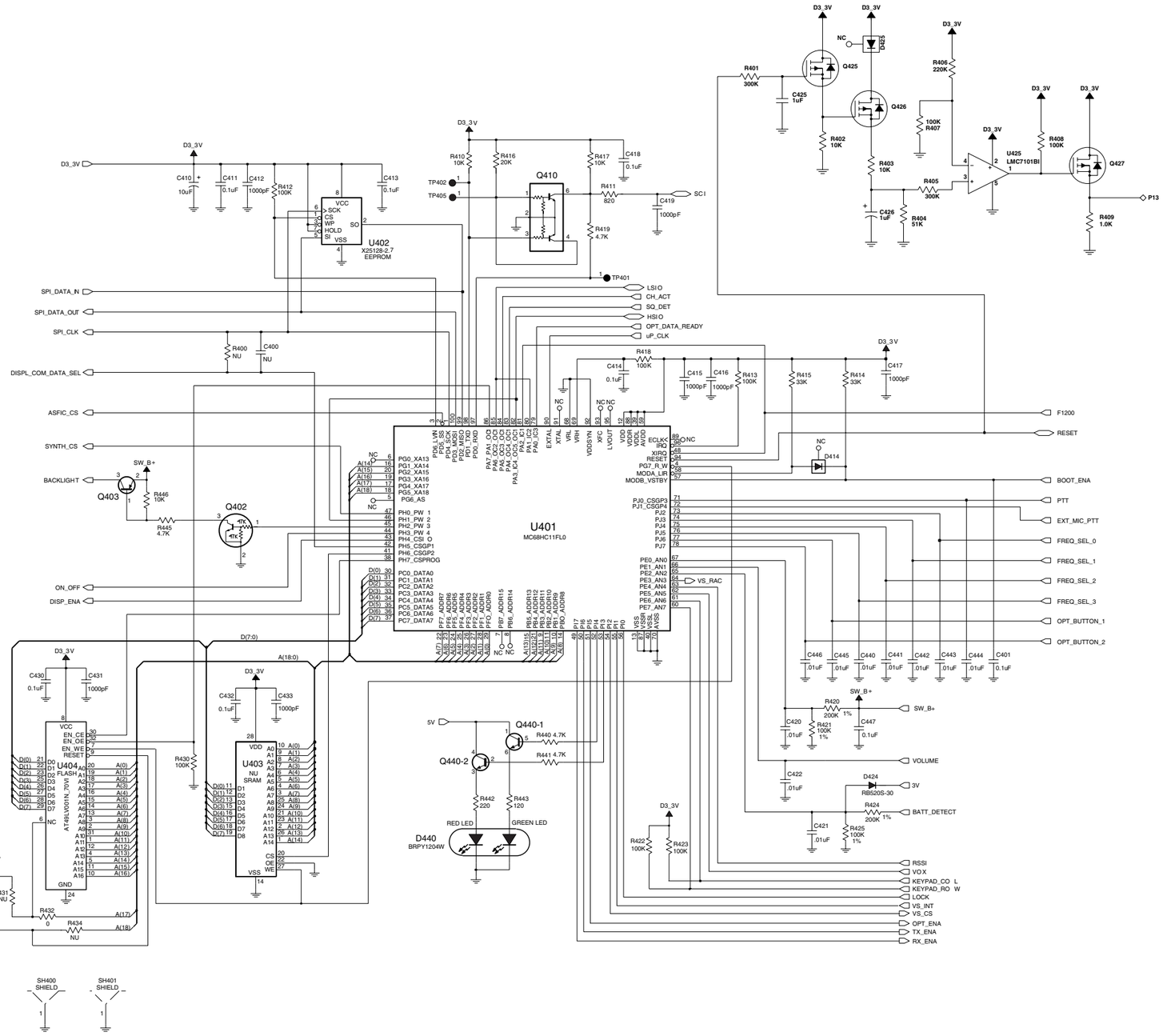


Figure 13-116. UHF (490–527 MHz) Microprocessor Circuitry Schematic Diagram (8486768Z02-A)

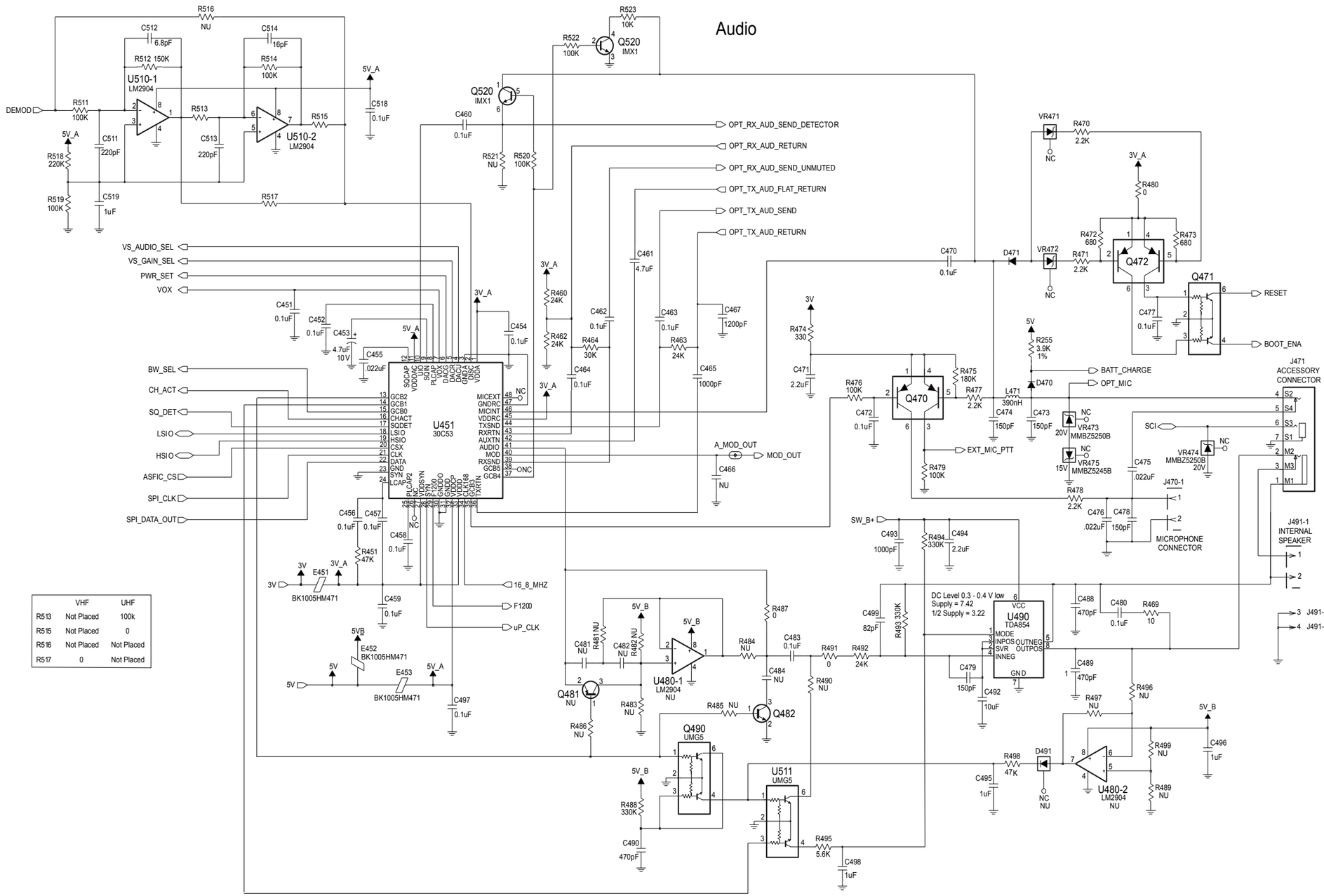


Figure 13-117. UHF (490–527 MHz) Audio Circuitry Schematic Diagram (8486768Z02-A)

DC Regulation

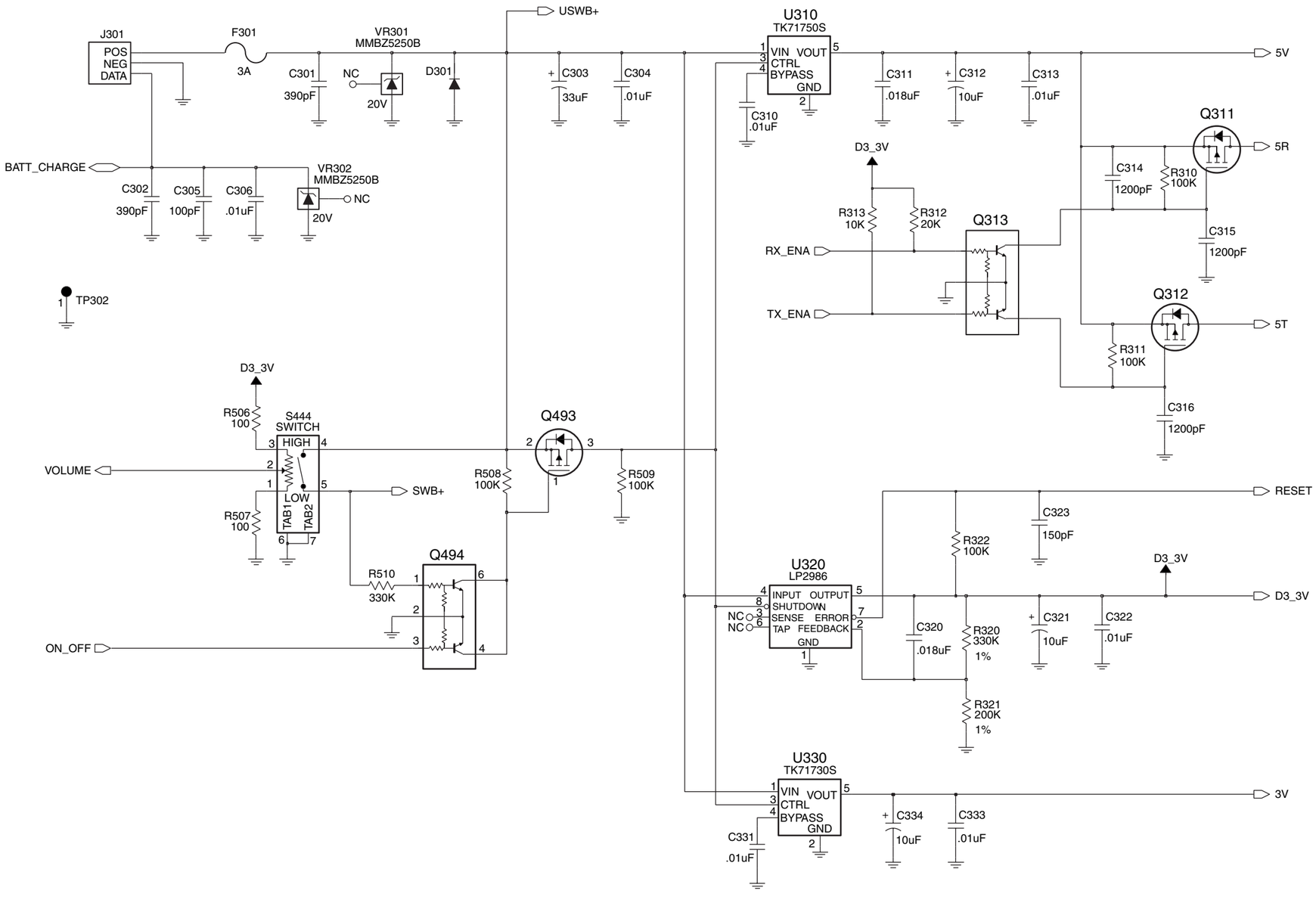


Figure 13-118. UHF (490–527 MHz) DC Regulation Schematic Diagram (8486768Z02-A)

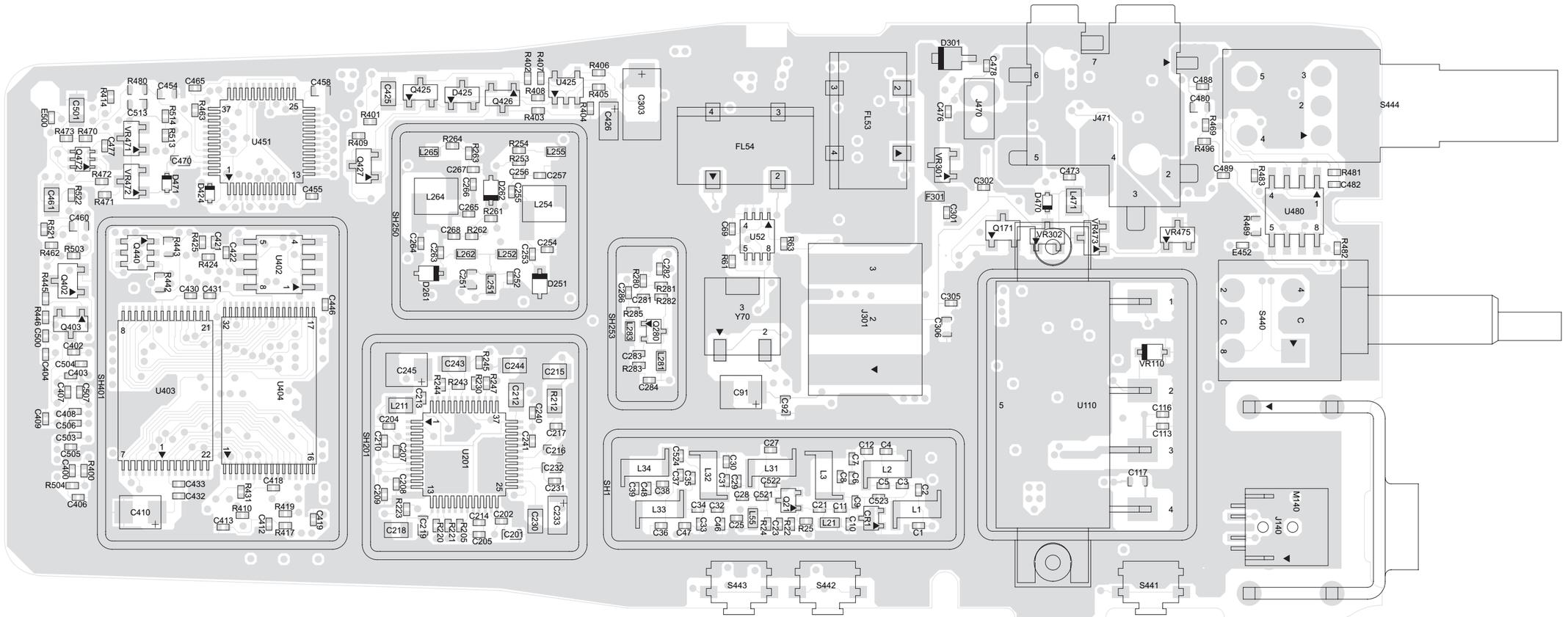


Figure 13-119. UHF (490–527 MHz) Board Component Side View (8486768Z02-A)

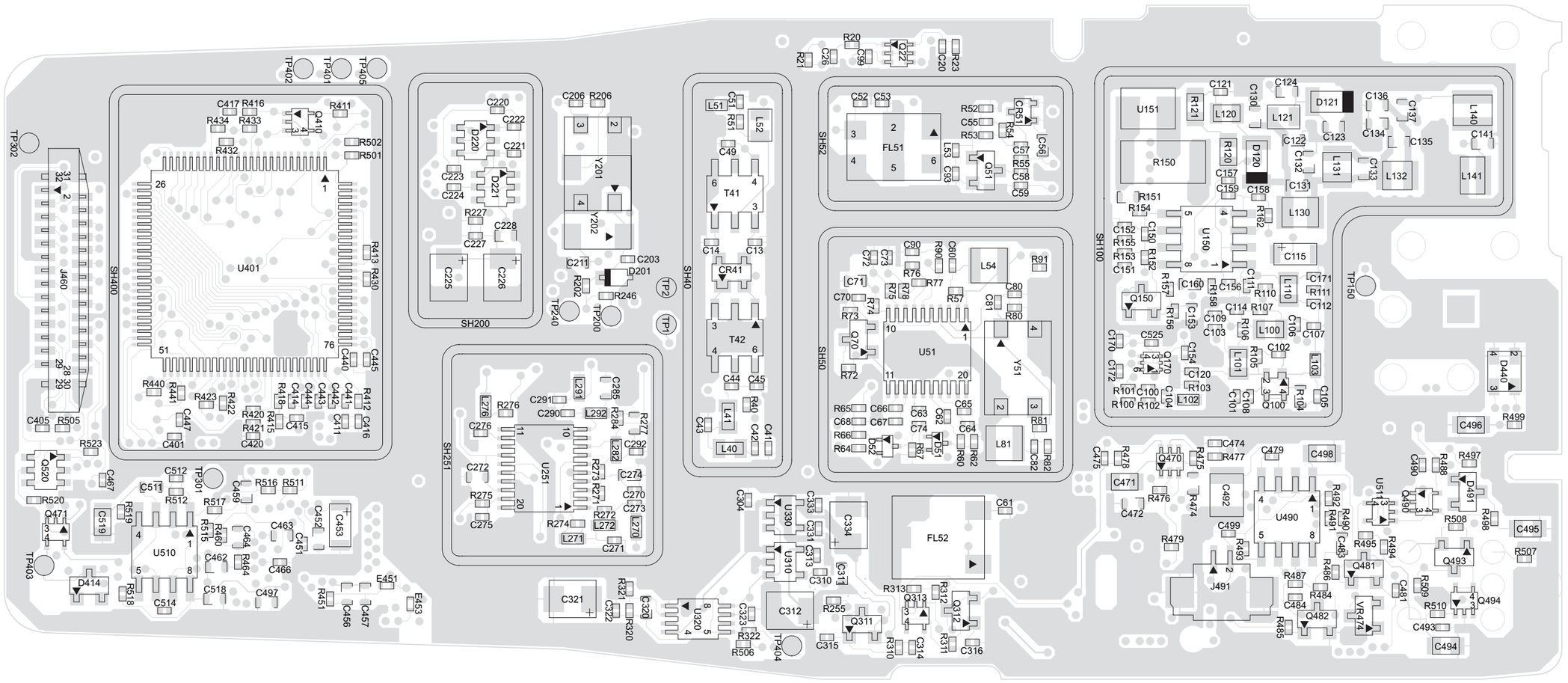


Figure 13-120. UHF (490–527 MHz) Board Solder Side View (8486768Z02-A)

UHF (490–527 MHz) Radio Parts List (8486768Z02-A)

Circuit Ref	Motorola Part No.	Description
C1	2109445U12	CAP, 2.4pF
C2	2109445U26	CAP, 9.1pF
C3	2109445U30	CAP, 6.0pF
C4	2109445U42	CAP, 24pF
C5	2109445U33	CAP, 9.0pF
C6	2109445U11	CAP, 2.2pF
C7	2109445U14	CAP, 3.0pF
C8	2109445U36	CAP, 13pF
C9	2109445U20	CAP, 5.1pF
C10	2109445U07	CAP, 1.5pF
C11	2113743L07	CAP, 390pF
C12	NOT PLACED	CAP, 8.2pF
C13	2109445U07	CAP, 1.5pF
C14	2109445U07	CAP, 1.5pF
C20	2113743L07	CAP, 390pF
C21	2109445U53	CAP, 68pF
C23	2113743L07	CAP, 390pF
C25	2113743L07	CAP, 390pF
C26	2113743L07	CAP, 390pF
C27	2109445U11	CAP, 2.2pF
C28	2109445U15	CAP, 3.3pF
C29	2109445U57	CAP, 100pF
C30	2109445U20	CAP, 5.1pF
C31	2109445U03	CAP, 1.0pF
C32	2109445U24	CAP, 7.5pF
C33	2109445U48	CAP, 43pF
C34	2109445U25	CAP, 8.2pF
C35	2109445U06	CAP, 1.3pF
C36	2109445U16	CAP, 3.6pF
C37	2109445U57	CAP, 100pF
C38	2109445U28	CAP, 4pF
C39	2109445U14	CAP, 3pF
C41	2109445U11	CAP, 2.2pF
C42	2109445U25	CAP, 8.2pF
C43	2109445U26	CAP, 9.1pF
C44	2109445U26	CAP, 9.1pF
C45	2109445U22	CAP, 6.2pF
C46	NOT PLACED	CAP, 10pF
C47	NOT PLACED	CAP, 10pF
C48	0662057M01	RES, 0
C49	2109445U12	CAP, 2.4pF
C51	2113743N48	CAP, 82pF
C52	2109445U41	CAP, 22pF
C53	2109445U26	CAP, 9.1pF
C55	2113743M24	CAP, 0.1uF
C56	2113743E20	CAP, 0.1uF
C57	2113743M24	CAP, 0.1uF
C58	2113743N16	CAP, 3.9pF
C59	2113743N12	CAP, 2.7pF
C60	2113743M24	CAP, 0.1uF
C61	2113743N46	CAP, 68pF
C62	2113743M24	CAP, 0.1uF
C63	2113743M24	CAP, 0.1uF
C64	2113743M24	CAP, 0.1uF
C65	2113743M24	CAP, 0.1uF
C66	2113743M24	CAP, 0.1uF
C67	2113743M24	CAP, 0.1uF
C68	2113743M24	CAP, 0.1uF
C69	2113743M24	CAP, 0.1uF
C70	2113743N53	CAP, 130pF
C71	2113743E20	CAP, 0.1uF
C72	2113743M24	CAP, 0.1uF
C73	2113743L33	CAP, 4700pF
C74	2113743N42	CAP, 47pF
C80	2109445U41	CAP, 22pF
C81	2109445U45	CAP, 33pF
C82	2109445U46	CAP, 36pF
C90	2113743M24	CAP, 0.1uF
C91	2311049A57	CAPP, 10uF
C92	2113743E20	CAP, 0.1uF
C93	NOT PLACED	CAP, 3.6pF
C99	2113743M24	CAP, 0.1uF
C100	2113743L07	CAP, 390pF
C101	2113743M24	CAP, 0.1uF
C102	2113743M24	CAP, 0.1uF
C103	2113743L07	CAP, 390pF
C104	2113743N22	CAP, 6.8pF
C105	NOT PLACED	CAP, 3.9pF
C106	2113743L07	CAP, 390pF
C107	NOT PLACED	CAP, 27pF
C108	2113743L07	CAP, 390pF
C109	2113743M24	CAP, 0.1uF
C111	2113743L07	CAP, 390pF
C112	2113743M24	CAP, 0.1uF
C113	2113743L07	CAP, 390pF
C114	2113743L07	CAP, 390pF
C115	2311049A07	CAPP, 1uF
C116	2113743M24	CAP, 0.1uF
C117	2113740F65	CAP, 390pF
C120	NOT PLACED	CAP, 8.2pF
C121	2113743L07	CAP, 390pF
C122	2113740F13	CAP, 2.7pF
C123	2113740F17	CAP, 3.9pF
C124	2113740F65	CAP, 390pF
C130	2113740F01	CAP, 50pF
C131	NOT PLACED	CAP, 2.2pF
C132	2113740F21	CAP, 5.6pF
C133	NOT PLACED	CAP, 2.7pF
C134	2113740F21	CAP, 5.6pF
C135	NOT PLACED	CAP, 0.5pF
C136	2113740F05	CAP, 1.2pF
C137	2113740F59	CAP, 220pF
C141	2113740F02	CAP, 0.75pF
C150	2113743L07	CAP, 390pF
C151	2113743L07	CAP, 390pF
C152	2113743L07	CAP, 390pF
C153	2113743K18	CAP, 0.47uF
C154	2113743L07	CAP, 390pF
C156	2113743L41	CAP, .01uF
C157	2113743M24	CAP, 0.1uF
C158	2113743L07	CAP, 390pF
C159	2113743L07	CAP, 390pF
C160	2113743E20	CAP, 0.1uF
C170	2113743L07	CAP, 390pF
C171	2113743L07	CAP, 390pF
C172	2113743L07	CAP, 390pF
C2	2109445U14	CAP, 3.0pF
C21	2109445U27	CAP, 10pF
C201	2113740F59	CAP, 220pF
C202	2109445U52	CAP, 62pF
C203	2109445U13	CAP, 2.7pF
C204	2113743L09	CAP, 470pF
C205	NOT PLACED	CAP, 2.7pF
C206	NOT PLACED	CAP, 1000pF
C207	2113743L09	CAP, 470pF
C208	2113743L09	CAP, 470pF
C209	2113743L09	CAP, 470pF
C210	2113743L09	CAP, 470pF
C211	2113743E20	CAP, 0.1uF
C212	2113743F18	CAP, 2.2uF
C213	2113743L41	CAP, .01uF
C214	2113743L17	CAP, 1000pF
C215	2113743F18	CAP, 2.2uF
C216	2113743E20	CAP, 0.1uF
C217	2113743L17	CAP, 1000pF
C218	2113743F18	CAP, 2.2uF
C219	2113743E20	CAP, 0.1uF
C220	2113743N34	CAP, 22pF
C221	2113743L41	CAP, .01uF
C222	2113743L41	CAP, .01uF
C223	2113743L41	CAP, .01uF
C224	2113743L41	CAP, .01uF
C225	2311049A57	CAPP, 10uF
C226	2311049A57	CAPP, 10uF
C227	2113743L17	CAP, 1000pF
C228	2113743E20	CAP, 0.1uF
C230	2113743F18	CAP, 2.2uF
C231	2113743L17	CAP, 1000pF
C232	2113743E20	CAP, 0.1uF
C233	2311049A56	CAPP, 4.7uF
C240	2109445U06	CAP, 1.3pF
C241	2113743N50	CAP, 100pF
C243	0886641Z01	CAP, 0.1uF
C244	0888600M25	CAP, .01uF
C245	2311049A08	CAPP, 1uF
C251	0888600M03	CAP, 150pF
C252	NOT PLACED	CAP, 390pF
C253	2109445U22	CAP, 6.2pF
C254	2109445U11	CAP, 2.2pF
C255	2109445U26	CAP, 9.1pF
C256	2109445U17	CAP, 3.9pF
C257	2109445U35	CAP, 12pF
C263	2109445U22	CAP, 6.2pF
C264	2109445U10	CAP, 2.0pF
C265	2109445U21	CAP, 5.6pF
C266	2109445U14	CAP, 3.0pF
C267	2109445U26	CAP, 9.1pF
C268	2109445U01	CAP, 0.5pF
C270	2113743L07	CAP, 390pF
C271	2113743L07	CAP, 390pF
C272	2113743E20	CAP, 0.1uF
C273	2113743L41	CAP, .01uF
C274	2113743E20	CAP, 0.1uF
C275	2113743L07	CAP, 390pF
C276	2109445U24	CAP, 7.5pF
C281	2113743L07	CAP, 390pF
C282	2109445U18	CAP, 4.3pF
C283	2113743L07	CAP, 390pF
C284	2113743L07	CAP, 390pF
C285	2113743E20	CAP, 0.1uF
C286	2109445U17	CAP, 3.9pF
C290	2109445U23	CAP, 6.8pF
C291	2109445U36	CAP, 13pF
C292	2113743L07	CAP, 390pF
C301	2113743L07	CAP, 390pF
C302	2113743L07	CAP, 390pF
C303	2311049A97	CAPP, 33uF
C304	2113743L41	CAP, .01uF
C305	2113743N50	CAP, 100pF
C306	2113741F49	CAP, .01uF
C310	2113743L41	CAP, .01uF
C311	2113743E05	CAP, .018uF
C312	2311049A57	CAPP, 10uF
C313	2113743L41	CAP, .01uF
C314	2113743L19	CAP, 1200pF
C315	2113743L19	CAP, 1200pF
C316	2113743L19	CAP, 1200pF
C320	2113743E05	CAP, .018uF
C321	2311049A57	CAPP, 10uF
C322	2113743L41	CAP, .01uF
C323	2113743N54	CAP, 150pF
C331	2113743L41	CAP, .01uF
C333	2113743L41	CAP, .01uF

Circuit Ref	Motorola Part No.	Description
C334	2311049A57	CAPP, 10uF
C400	NOT PLACED	CAP, .022uF
C401	2113743M24	CAP, 0.1uF
C402	2113743L17	CAP, 1000pF
C403	2113743N50	CAP, 150pF
C404	2113743L17	CAP, 1000pF
C405	2113743N50	CAP, 150pF
C406	2113743N50	CAP, 150pF
C407	2113743L17	CAP, 1000pF
C408	2113743L17	CAP, 1000pF
C409	2113743L17	CAP, 1000pF
C410	2311049A57	CAPP, 10uF
C411	2113743M24	CAP, 0.1uF
C412	2113743L17	CAP, 1000pF
C413	2113743M24	CAP, 0.1uF
C414	2113743M24	CAP, 0.1uF
C415	2113743L17	CAP, 1000pF
C416	2113743L17	CAP, 1000pF
C417	2113743L17	CAP, 1000pF
C418	2113743M24	CAP, 0.1uF
C419	2113743L17	CAP, 1000pF
C420	2113743L41	CAP, .01uF
C421	2113743L41	CAP, .01uF
C422	2113743L41	CAP, .01uF
C425	2113743A31	CAP, 1.0uF 10% X7R
C426	2311049A07	CAP, 1.0uF
C430	2113743M24	CAP, 0.1uF
C431	2113743L17	CAP, 1000pF
C432	2113743M24	CAP, 0.1uF
C433	2113743L17	CAP, 1000pF
C440	2113743L41	CAP, .01uF
C441	2113743L41	CAP, .01uF
C442	2113743L41	CAP, .01uF
C443	2113743L41	CAP, .01uF
C444	2113743L41	CAP, .01uF
C445	2113743L41	CAP, .01uF
C446	2113743L41	CAP, .01uF
C447	2113743M24	CAP, 0.1uF
C451	2113743M24	CAP, 0.1uF
C452	2113743E20	CAP, 0.1uF
C453	2311049A56	CAPP, 4.7uF
C454	2113743E20	CAP, 0.1uF
C455	2113743L48	CAP, .022uF
C456	2113743E20	CAP, 0.1uF
C457	2113743E20	CAP, 0.1uF
C458	2113743E20	CAP, 0.1uF
C459	2113743E20	CAP, 0.1uF
C460	2113743E20	CAP, 0.1uF
C461	2113928C04	CAP, 4.7uF
C462	2113743E20	CAP, 0.1uF
C463	2113743E20	CAP, 0.1uF
C464	2113743E20	CAP, 0.1uF
C465	2113743L17	CAP, 1000pF
C466	NOT PLACED	CAP, 470pF
C467	2113743L19	CAP, 1200pF
C470	2113743E20	CAP, 0.1uF
C471	2113743F18	CAP, 2.2uF
C472	2113743E20	CAP, 0.1uF
C473	2113743N54	CAP, 150pF
C474	2113743N54	CAP, 150pF
C475	2113743L48	CAP, .022uF
C476	2113743L48	CAP, .022uF
C477	2113743M24	CAP, 0.1uF
C478	2113743N54	CAP, 150pF
C479	2113743N54	CAP, 150pF
C480	2113743E20	CAP, 0.1uF
C481	NOT PLACED	CAP, .01uF
C482	NOT PLACED	CAP, .01uF
C483	2113743E20	CAP, 0.1uF
C484	NOT PLACED	CAP, .033uF
C488	2113743L09	CAP, 470pF
C489	2113743L09	CAP, 470pF
C490	2113743L09	CAP, 470pF
C492	2113928J08	CAP, 10uF
C493	2113743L17	CAP, 1000pF
C494	2113743F18	CAP, 2.2uF
C495	2113743F16	CAP, 1uF
C496	2113743F16	CAP, 1uF
C497	2113743E20	CAP, 0.1uF
C498	2113743F16	CAP, 1uF
C499	2113743N48	CAP, 82pF
C500	2113743L17	CAP, 1000pF
C501	2113743F16	CAP, 1uF
C503	2113743L17	CAP, 1000pF
C504	2113743L17	CAP, 1000pF
C505	2113743L17	CAP, 1000pF
C506	2113743L17	CAP, 1000pF
C507	2113743L17	CAP, 1000pF
C511	2113740F59	CAP, 220pF
C512	2113743N22	CAP, 6.8pF
C513	2113740F59	CAP, 220pF
C514	2113743N31	CAP, 16pF
C518	2113743E20	CAP, 0.1uF
C519	2113743F16	CAP, 1uF
C521	2109445U28	CAP, 4pF
C522	2109445U07	CAP, 1.5pF
C523	2186463Z05	CAP, 0.6pF
C524	2186463Z05	CAP, 0.6pF
C525	2113743L07	CAP, 390pF
CR1	4813825A19	MMBD352
CR41	4802246J04	HSMS2829
CR51	4813825A19	MMBD352
D51	4802245J97	DAN235ETL
D52	4802245J97	DAN235ETL
D120	4880973Z02	MA4PH261
D121	4880973Z02	MA4PH261
D201	4862824C03	1SV232
D220	4802233J09	IMN10
D221	4802233J09	IMN10
D251	4862824C01	1SV229
D261	4862824C01	1SV229
D262	4862824C01	1SV229
D301	4813833A19	MBRM120ET3
D414	4805129M41	MMBD501
D424	4809924D18	RB520S-30
D425	4805129M41	SOT SMBD1022 RH29M19 LH
D440	4805729G49	BRPY1204W
D470	4809924D18	RB520S-30
D471	4809924D18	RB520S-30
D491	NOT PLACED	MMBD501
E451	2480640Z01	BK1005HM471
E452	2480640Z01	BK1005HM471
E453	2480640Z01	BK1005HM471
E500	2480640Z01	BK1005HM471
F301	6580542Z01	FUSE
FL51	9186801Z01	OSC,XTAL,,44.85MHZ
FL52	9180468V04	FLTR
FL53	9180469V05	CFWC455E
FL54	9180469V03	CFWC455G
J140	0986428Z01	CONN_J
J301	0986565Z01	CONN_J
J460	NOT PLACED	CONN_J
J470	0985818A01	CONN_J
J471	0980683Z03	CONN_J
J491	2809926G01	CONN_P
L1	2409348J15	IDCTR, 9.85nH
L2	2409348J15	IDCTR, 9.85nH
L3	2409348J15	IDCTR, 9.85nH
L21	2413926N18	IDCTR, 33nH
L31	2409348J15	IDCTR, 9.85nH
L32	2409348J15	IDCTR, 9.85nH
L33	2409348J15	IDCTR, 9.85nH
L34	2409348J15	IDCTR, 9.85nH
L40	2413926K16	IDCTR, 27nH
L41	2413926K16	IDCTR, 27nH
L51	2413926N26	IDCTR, 150nH
L52	2462587V43	IDCTR, 560nH
L53	2113743N52	CAP, 120pF
L54	2413923A25	IDCTR, 1.2uH
L55	2413926N16	IDCTR, 22nH
L81	2413923A19	IDCTR, 1uH
L100	2413926K27	IDCTR, 220nH
L101	2413926K27	IDCTR, 220nH
L102	2409377M25	IDCTR, 7.5nH
L103	2409377M24	IDCTR, 5.1nH
L110	2413926K27	IDCTR, 220nH
L120	2413926K27	IDCTR, 220nH
L121	2462587V24	IDCTR, 15nH
L130	2460591C23	IDCTR, 13.85nH
L131	2460591C40	IDCTR, 17.02nH
L132	2460591C40	IDCTR, 17.02nH
L140	2460591L14	IDCTR, 15.92nH
L141	2479990M01	IDCTR, 30.54nH
L211	2413926K30	IDCTR, 390nH
L251	2413926N28	IDCTR, 220nH
L252	2413926N17	IDCTR, 27nH
L254	2484562T11	IDCTR, 12.5nH
L255	2413926N28	IDCTR, 220nH
L262	2413926N17	IDCTR, 27nH
L264	2484562T13	IDCTR, 8nH
L265	2413926N28	IDCTR, 220nH
L270	2413926N28	IDCTR, 220nH
L271	NOT PLACED	IDCTR, 220nH
L272	2413926N28	IDCTR, 220nH
L276	2413926N17	IDCTR, 27nH
L281	2413926N15	IDCTR, 18nH
L282	2413926N15	IDCTR, 18nH
L283	NOT PLACED	IDCTR, 22nH
L291	2413926N10	IDCTR, 6.8nH
L292	2413926N14	IDCTR, 15nH
L471	2413926K30	IDCTR, 390nH
M140	0286427Z01	ANTENNA_NUT
Q21	4802247J01	BFS505
Q22	4805723X02	UMT1
Q51	4802197J95	PBR941
Q70	4880214G02	MMBT3904
Q100	4885593U03	BFG540W
Q150	4880214G02	MMBT3904
Q170	4809939C34	EMB10
Q171	4880048M01	DTC144EKA
Q280	4802245J95	BFS540
Q311	4809579E18	TP0101T
Q312	4809579E18	TP0101T
Q313	4802245J54	UMG5
Q402	4880048M01	DTC144EKA
Q403	4813824A17	MMBT3906
Q410	4802245J54	UMG5
Q425	4809579E18	TSTR MOSFET P-CHAN TP010IT
Q426	4809579E18	TSTR MOSFET P-CHAN TP010IT
Q427	4809579E18	TSTR MOSFET P-CHAN TP010IT

Circuit Ref	Motorola Part No.	Description
Q440	5180159R01	IMX1
Q470	4805723X02	UMT1
Q471	4802245J54	UMG5
Q472	4805723X02	UMT1
Q481	NOT PLACED	MMBT3906
Q482	NOT PLACED	MMBT3904
Q490	4802245J54	UMG5
Q493	4809579E18	TP0101T
Q494	4802245J54	UMG5
Q520	5180159R01	IMX1
R20	0662057M92	RES, 5.6K
R21	0662057M49	RES, 91
R22	0662057M92	RES, 5.6K
R23	0662057N09	RES, 27K
R24	0662057M78	RES, 1.5K
R25	0662057M92	RES, 5.6K
R40	0662057M74	RES, 1K
R51	0662057M43	RES, 51
R52	0662057N01	RES, 12K
R53	0662057N11	RES, 33K
R54	0662057M93	RES, 6.2K
R55	0662057M62	RES, 330
R57	0662057M90	RES, 4.7K
R60	0662057M83	RES, 2.4K
R61	0662057N23	RES, 100K
R62	0662057M86	RES, 3.3K
R63	0662057N13	RES, 39K
R64	0662057N06	RES, 20K
R65	0662057N13	RES, 39K
R66	0662057N06	RES, 20K
R67	0662057N06	RES, 20K
R72	0662057M64	RES, 390
R73	0662057M80	RES, 1.8K
R74	0662057M76	RES, 1.2K
R75	0662057N01	RES, 12K
R76	0662057V04	RES, 12K
R77	0662057U99	RES, 8.2K
R78	0662057M70	RES, 680
R80	0662057M91	RES, 5.1K
R81	0662057M74	RES, 1K
R82	NOT PLACED	RES, 0
R90	0662057M43	RES, 51
R91	0662057M79	RES, 1.6K
R100	0662057M72	RES, 820
R101	0662057M20	RES, 5.6
R102	0662057M72	RES, 820
R103	0662057M85	RES, 3K
R104	0662057A07	RES, 18
R105	0662057M84	RES, 2.7K
R106	0662057M90	RES, 4.7K
R107	NOT PLACED	RES, 300
R110	0662057M70	RES, 680
R111	0662057M81	RES, 2K
R120	0662057C55	RES, 150
R121	0662057C55	RES, 150
R150	0680539Z01	RES, 0.1
R151	0662057A15	RES, 39
R152	0662057V27	RES, 100K
R153	0662057V27	RES, 100K
R154	0662057V27	RES, 100K
R155	0662057V27	RES, 100K
R156	0662057M62	RES, 330
R157	0662057M82	RES, 2.2K
R158	0662057M78	RES, 1.5K
R162	0662057M98	RES, 10K
R202	0662057N27	RES, 150K
R205	0662057M50	RES, 100
R206	NOT PLACED	RES, 100
R212	0662057C01	RES, 0
R220	0662057M34	RES, 22
R221	0662057M34	RES, 22
R223	0662057M50	RES, 100
R227	0662057N13	RES, 39K
R230	0662057N06	RES, 20K
R243	0662057M72	RES, 820
R244	0662057M43	RES, 51
R245	0662057M78	RES, 1.5K
R246	0662057N23	RES, 100K
R247	0662057N05	RES, 18K
R253	0662057M42	RES, 47
R254	0662057M50	RES, 100
R255	0662057U91	RES, 3.9K
R261	0662057N07	RES, 22K
R262	0662057M95	RES, 7.5K
R263	0662057M38	RES, 33
R264	0662057M50	RES, 100
R271	0662057M91	RES, 5.1K
R272	0662057M93	RES, 6.2K
R273	0662057M62	RES, 330
R274	0662057M38	RES, 33
R275	0662057M50	RES, 100
R276	NOT PLACED	RES, 1K
R277	0662057B47	RES, 0
R280	0662057M90	RES, 4.7K
R281	0662057M96	RES, 8.2K
R282	0662057M73	RES, 910
R283	0662057M53	RES, 130
R284	0662057M70	RES, 680
R285	0662057M01	RES, 0
R310	0662057N23	RES, 100K
R311	0662057N23	RES, 100K
R312	0662057N06	RES, 20K
R313	0662057M98	RES, 10K
R320	0662057V43	RES, 330K
R321	0662057V35	RES, 200K
R322	0662057N23	RES, 100K
R400	NOT PLACED	RES, 100K
R401	0662057N34	RES, 300K
R402	0662057M98	RES, 10K
R403	0662057M98	RES, 10K
R404	0662057N16	RES, 51K
R405	0662057N34	RES, 300K
R406	0662057N31	RES, 220K
R407	0662057N23	RES, 100K
R408	0662057N23	RES, 100K
R409	0662057M74	RES, 1K 5% 20X40
R410	0662057M98	RES, 10K
R411	0662057M72	RES, 820
R412	0662057N23	RES, 100K
R413	0662057N23	RES, 100K
R414	0662057N11	RES, 33K
R415	0662057N11	RES, 33K
R416	0662057N06	RES, 20K
R417	0662057M98	RES, 10K
R418	0662057N23	RES, 100K
R419	0662057M90	RES, 4.7K
R420	0662057V35	RES, 200K
R421	0662057V27	RES, 100K
R422	0662057N23	RES, 100K
R423	0662057N23	RES, 100K
R424	0662057V35	RES, 200K
R425	0662057V27	RES, 100K
R430	0662057N23	RES, 100K
R431	NOT PLACED	RES, 100K
R432	0662057M01	RES, 0
R433	0662057N23	RES, 100K
R434	NOT PLACED	RES, 100K
R440	0662057M90	RES, 4.7K
R441	0662057M90	RES, 4.7K
R442	0662057A33	RES, 220
R443	0662057A27	RES, 120
R445	0662057M90	RES, 4.7K
R446	0662057M98	RES, 10K
R451	0662057N15	RES, 47K
R460	0662057N08	RES, 24K
R462	0662057N08	RES, 24K
R463	0662057N08	RES, 24K
R464	0662057N10	RES, 30K
R469	0662057M26	RES, 10
R470	0662057M82	RES, 2.2K
R471	0662057M82	RES, 2.2K
R472	0662057M70	RES, 680
R473	0662057M70	RES, 680
R474	0662057A37	RES, 330
R475	0662057N29	RES, 180K
R476	0662057N23	RES, 100K
R477	0662057M82	RES, 2.2K
R478	0662057M82	RES, 2.2K
R479	0662057N23	RES, 100K
R480	0662057B47	RES, 0
R481	NOT PLACED	RES, 100K
R482	NOT PLACED	RES, 330K
R483	NOT PLACED	RES, 150K
R484	NOT PLACED	RES, 2.2K
R485	NOT PLACED	RES, 100K
R486	NOT PLACED	RES, 100K
R487	0662057M01	RES, 0
R488	0662057N35	RES, 330K
R489	NOT PLACED	RES, 91K
R490	NOT PLACED	RES, 2.2K
R491	0662057M01	RES, 0
R492	0662057N08	RES, 24K
R493	0662057N35	RES, 330K
R494	0662057V43	RES, 330K
R495	0662057M92	RES, 5.6K
R496	NOT PLACED	RES, 10K
R497	NOT PLACED	RES, 1MEG
R498	NOT PLACED	RES, 47K
R499	NOT PLACED	RES, 270K
R501	0662057M50	RES, 100
R502	0662057M50	RES, 100
R503	0662057M50	RES, 100
R504	0662057M50	RES, 100
R505	0662057M50	RES, 100
R506	0662057M50	RES, 100
R507	0662057M50	RES, 100
R508	0662057N23	RES, 100K
R509	0662057N23	RES, 100K
R510	0662057N35	RES, 330K
R511	0662057N23	RES, 100K
R512	0662057N27	RES, 150K
R513	0662057N23	RES, 100K
R514	0662057N23	RES, 100K
R515	0662057M01	RES, 0
R516	NOT PLACED	RES, 0
R517	NOT PLACED	RES, 0
R518	0662057N31	RES, 220K
R519	0662057N23	RES, 100K
R520	0662057N23	RES, 100K
R521	NOT PLACED	RES, 100K
R522	0662057N23	RES, 100K
R523	0662057M98	RES, 10K
S440	4080710Z22	SWITCH, ROTARY, 16-CHANNEL SELECT

Circuit Ref	Motorola Part No.	Description
	4080710Z34	SWITCH, ROTARY, 4 CHANNEL SELECT
S441	4070354A01	SWITCH
S442	4070354A01	SWITCH
S443	4070354A01	SWITCH
S444	1880619Z02	SWITCH
SH1	2686421Z01	SHIELD
SH40	2686419Z01	SHIELD
SH50	2686423Z01	SHIELD
SH52	2686424Z01	SHIELD
SH100	2686418Z01	SHIELD
SH200	2686424Z01	SHIELD
SH201	2686423Z01	SHIELD
SH250	2686425Z01	SHIELD
SH251	2686425Z01	SHIELD
SH253	2686422Z01	SHIELD
SH400	2686420Z01	SHIELD
SH401	2686420Z01	SHIELD
T41	2580541Z02	XFMR
T42	2580541Z02	XFMR
U51	5186144B01	SA616
U52	5109522E10	TC7W04F
U110	0186438Z02	RA07M4452M_UHF
U150	5113818A01	LM2904
U151	2484657R01	57R01
U201	5185963A27	63A27
U251	5105750U54	50U54
U310	5102478J01	TK71750S
U320	5185963A55	LP2986
U330	5102479J01	TK71730S
U401*	5102226J56	MC68HC11FL0
U402	5102463J64	X25128-2.7
U403	NOT PLACED	SRM2B256
U404	5102480J01	1M FLASH ROM IC
U425	5162852A09	LOW PWR OP AMP W/RAIL TO RAIL
U451	5185130C53	30C53
U480	NOT PLACED	LM2904
U490	5108858K99	TDA8541
U510	5113818A01	LM2904
U511	4802245J54	UMG5
VR110	4813830A86	MM3Z3V9T1
VR301	4813830A33	MMBZ5250B
VR302	4813830A33	MMBZ5250B
VR471	4813830A18	MMBZ5235B
VR472	4813830A09	MMBZ5226B
VR473	4813830A33	MMBZ5250B
VR474	4813830A33	MMBZ5250B
VR475	4880140L20	MMBZ5245B
Y51	4802245J84	TSS2_44_395MHZ
Y70	9186145B02	45B02
Y201*	4880114R06	14R06
Y202	NOT PLACED	45J68

* Motorola Depot Servicing only

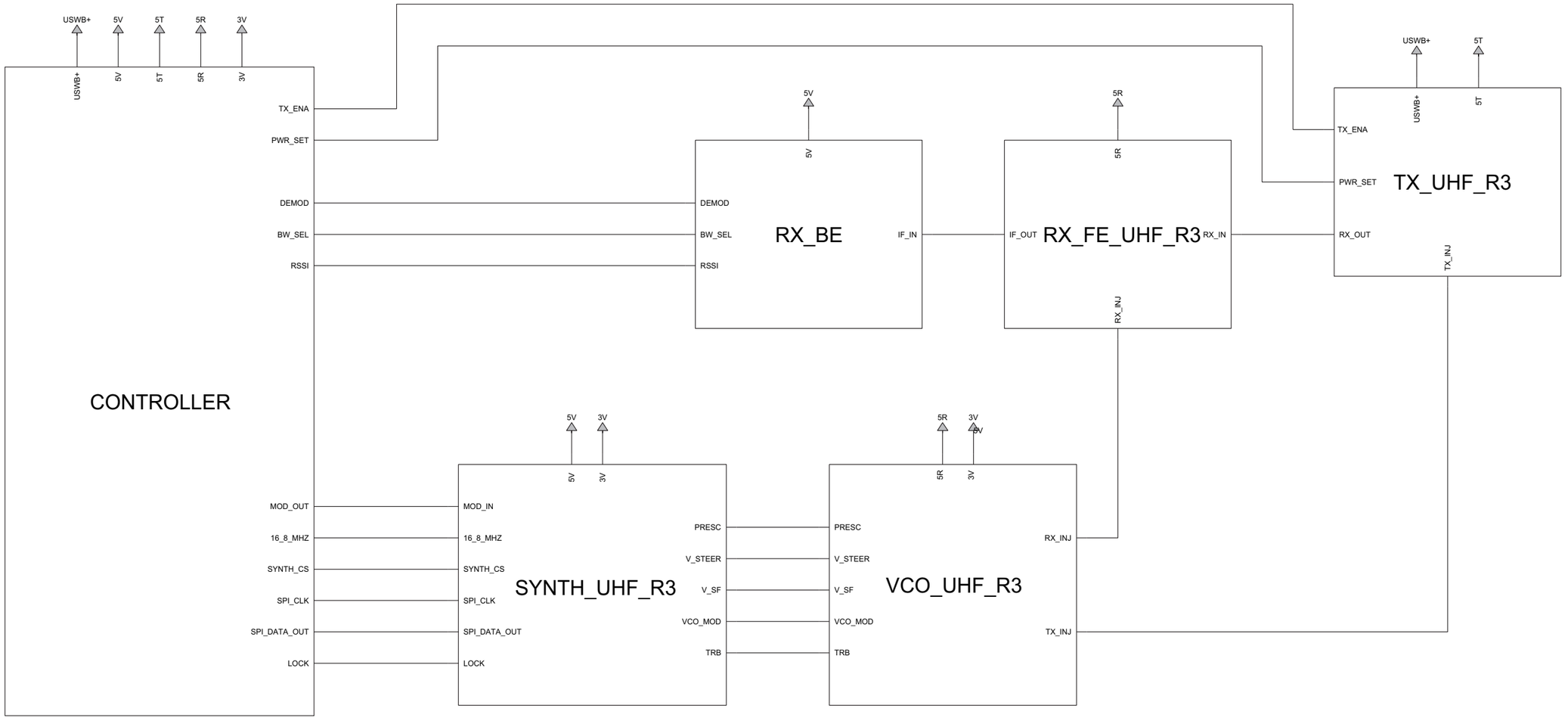


Figure 13-121. UHF (490–527 MHz) Radio Circuit Block Diagram (8416846H01-A/B)

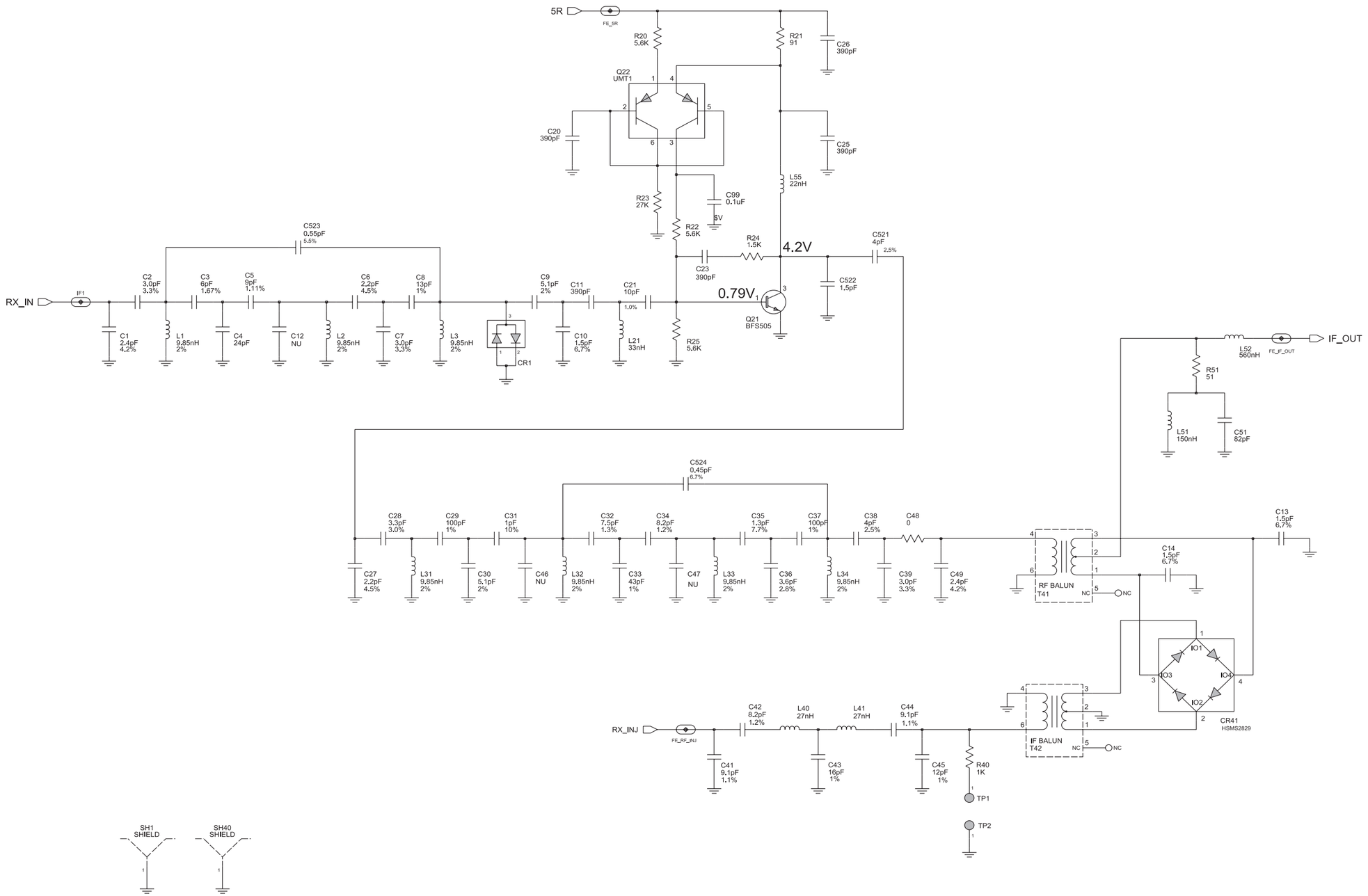


Figure 13-122. UHF (490–527 MHz) Receiver Front End Schematic Diagram (8416846H01-A/B)

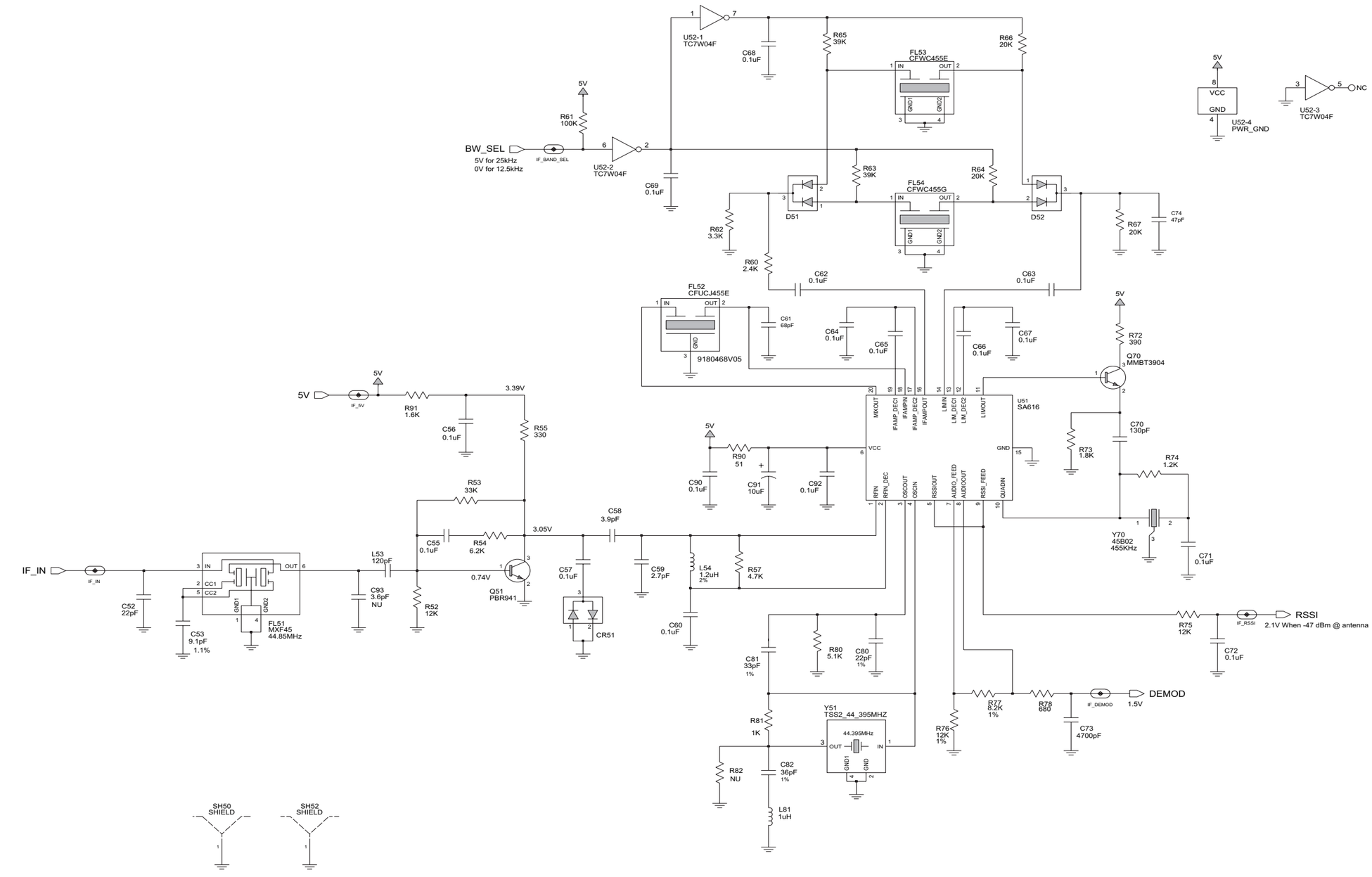
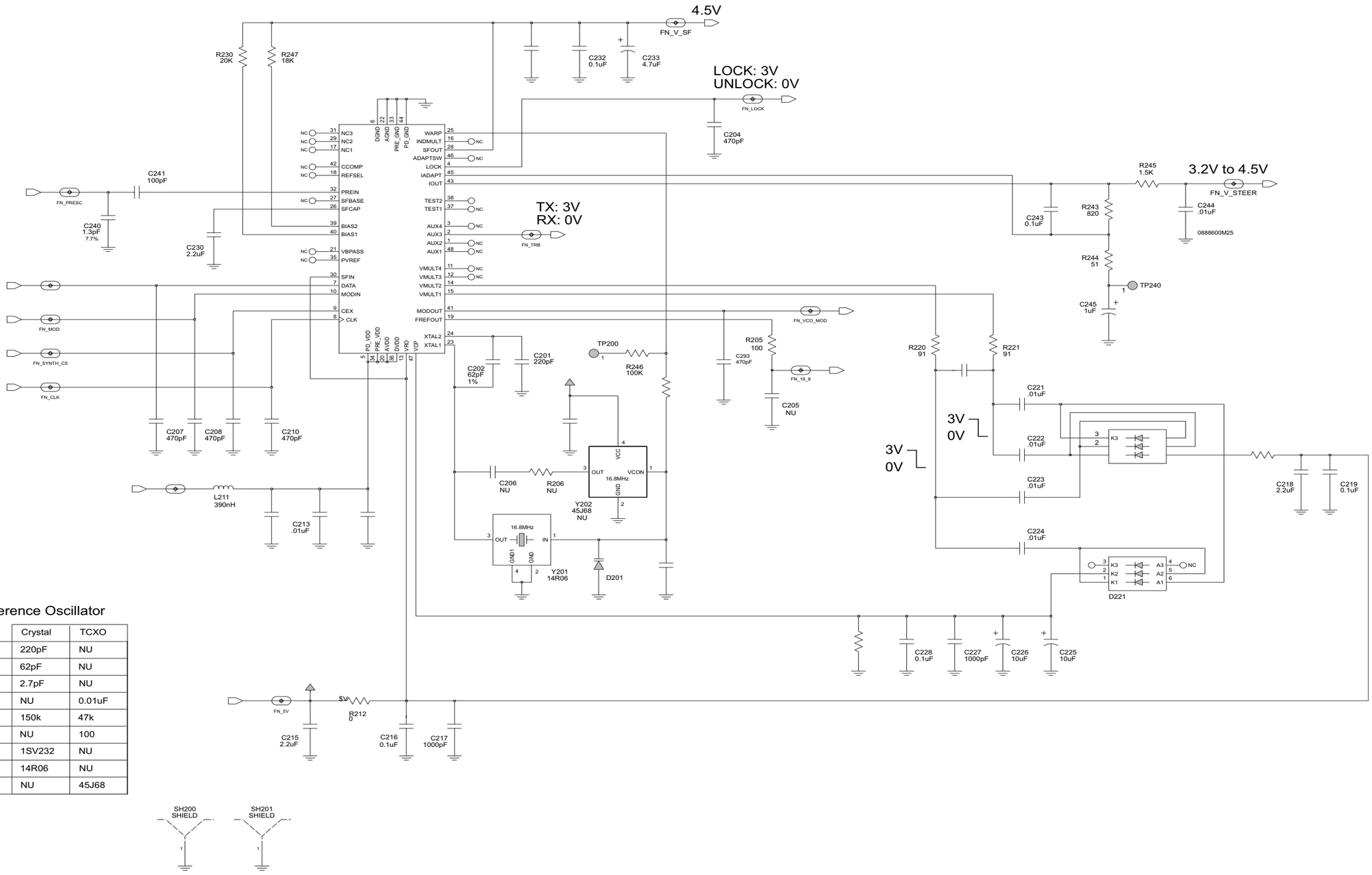


Figure 13-123. UHF (490–527 MHz) Receiver Back End Schematic Diagram (8416846H01-A/B)



Reference Oscillator

	Crystal	TCXO
C201	220pF	NU
C202	62pF	NU
C203	2.7pF	NU
C206	NU	0.01uF
R202	150k	47k
R206	NU	100
D201	1SV232	NU
Y201	14R06	NU
Y202	NU	45J68

Figure 13-124. UHF (490–527 MHz) Synthesizer Schematic Diagram (8416846H01-A/B)

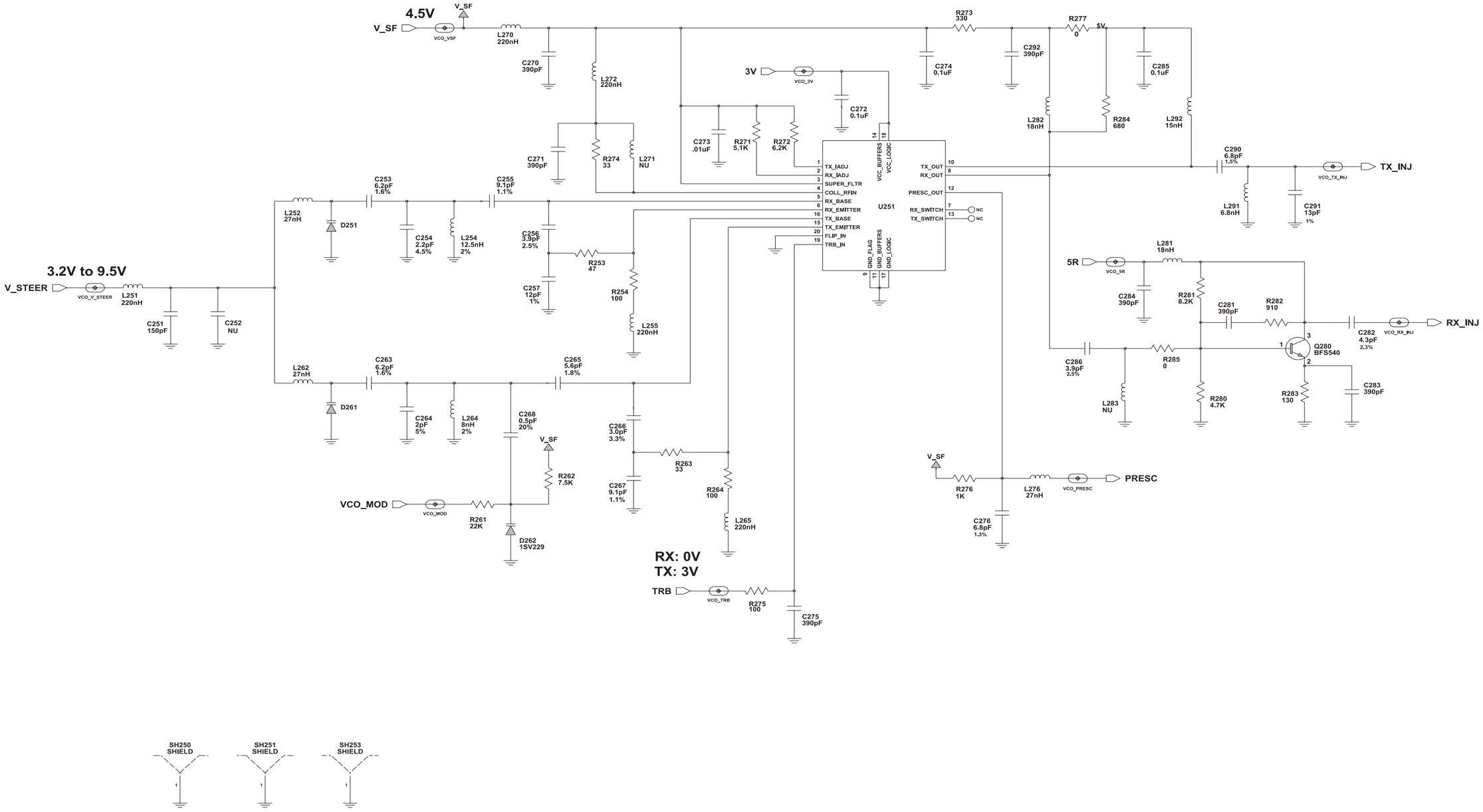


Figure 13-125. UHF (490–527 MHz) Voltage Controlled Oscillator Schematic Diagram (8416846H01-A/B)

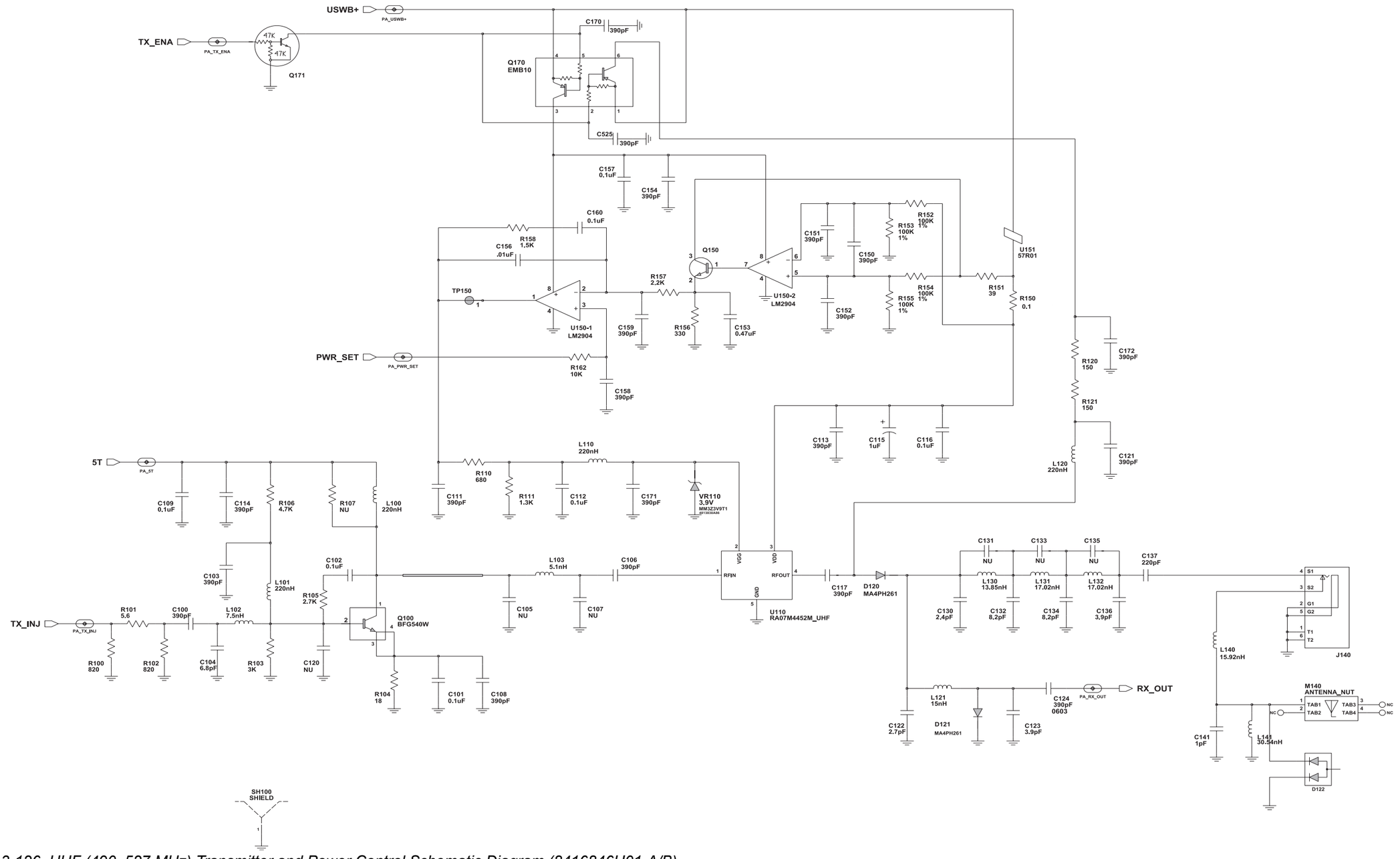


Figure 13-126. UHF (490–527 MHz) Transmitter and Power Control Schematic Diagram (8416846H01-A/B)

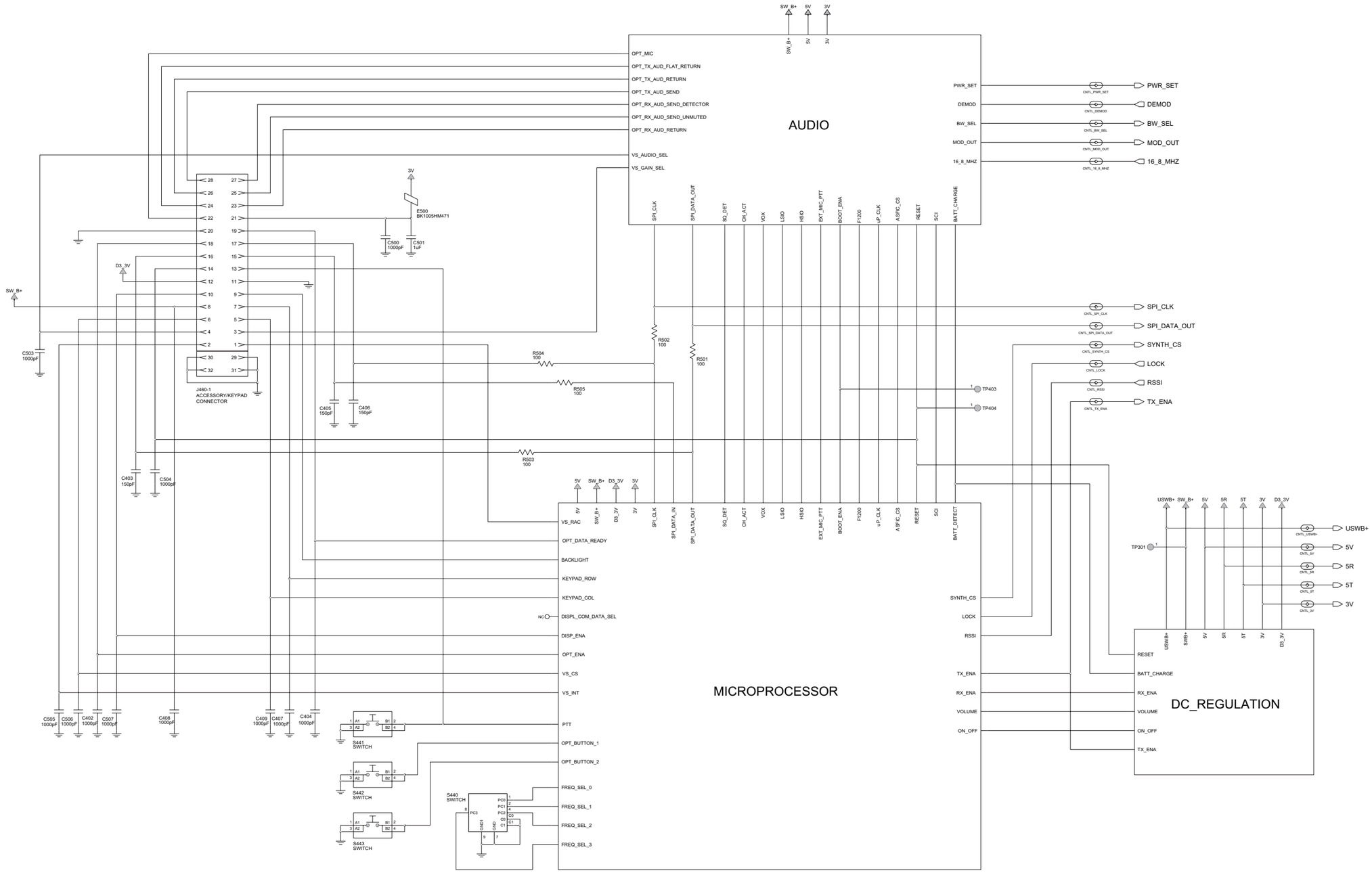


Figure 13-127. UHF (490–527 MHz) Controller Interconnect Schematic Diagram (8416846H01-A/B)

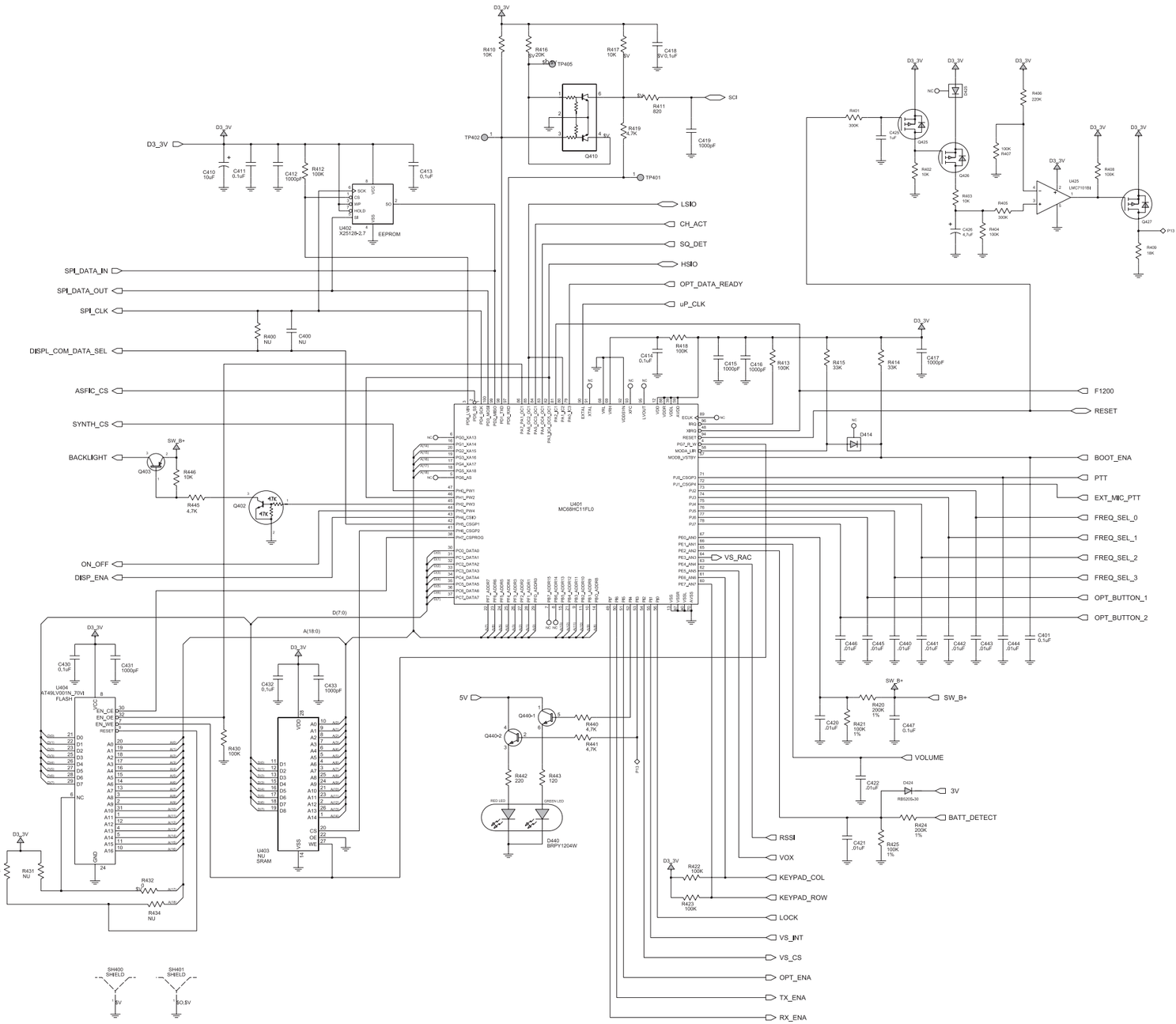


Figure 13-128. UHF (490–527 MHz) Microprocessor Circuitry Schematic Diagram (8416846H01-A/B)

	VHF	UHF
R513	Not Placed	100k
R515	Not Placed	0
R516	Not Placed	Not Placed
R517	0	Not Placed

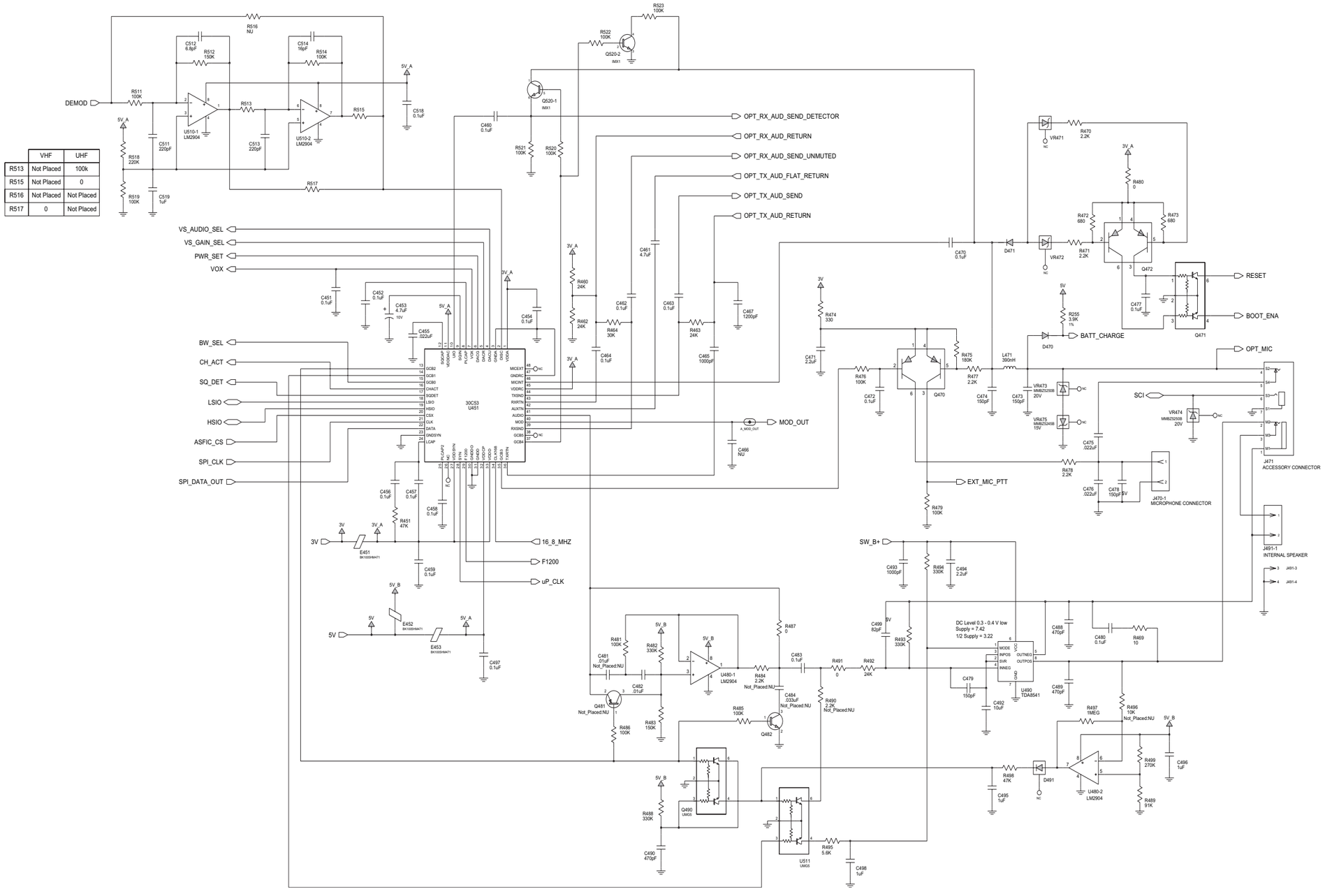


Figure 13-129. UHF (490–527 MHz) Audio Circuitry Schematic Diagram (8416846H01-A/B)

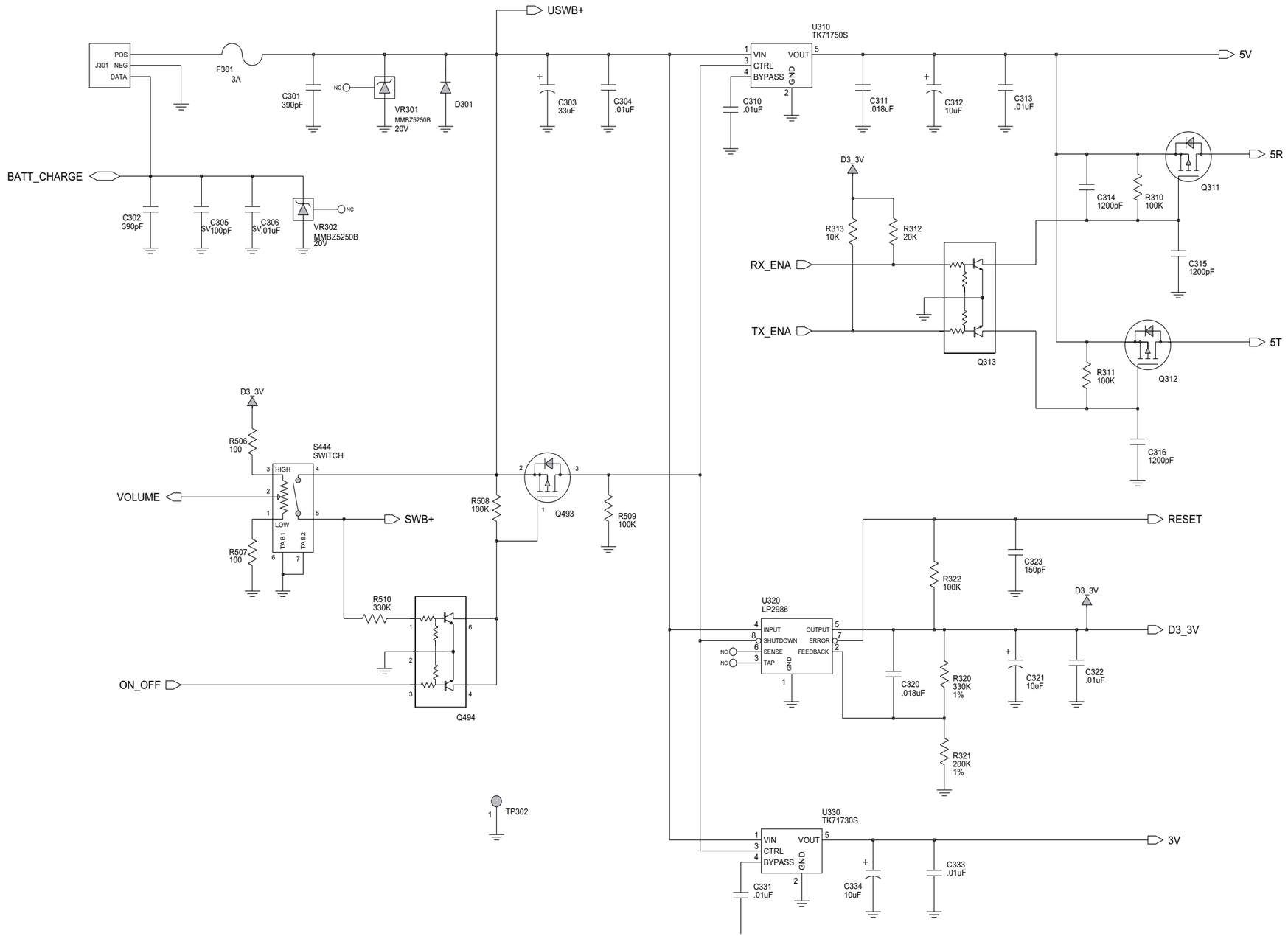


Figure 13-130. UHF (490–527 MHz) DC Regulation Schematic Diagram (8416846H01-A/B)

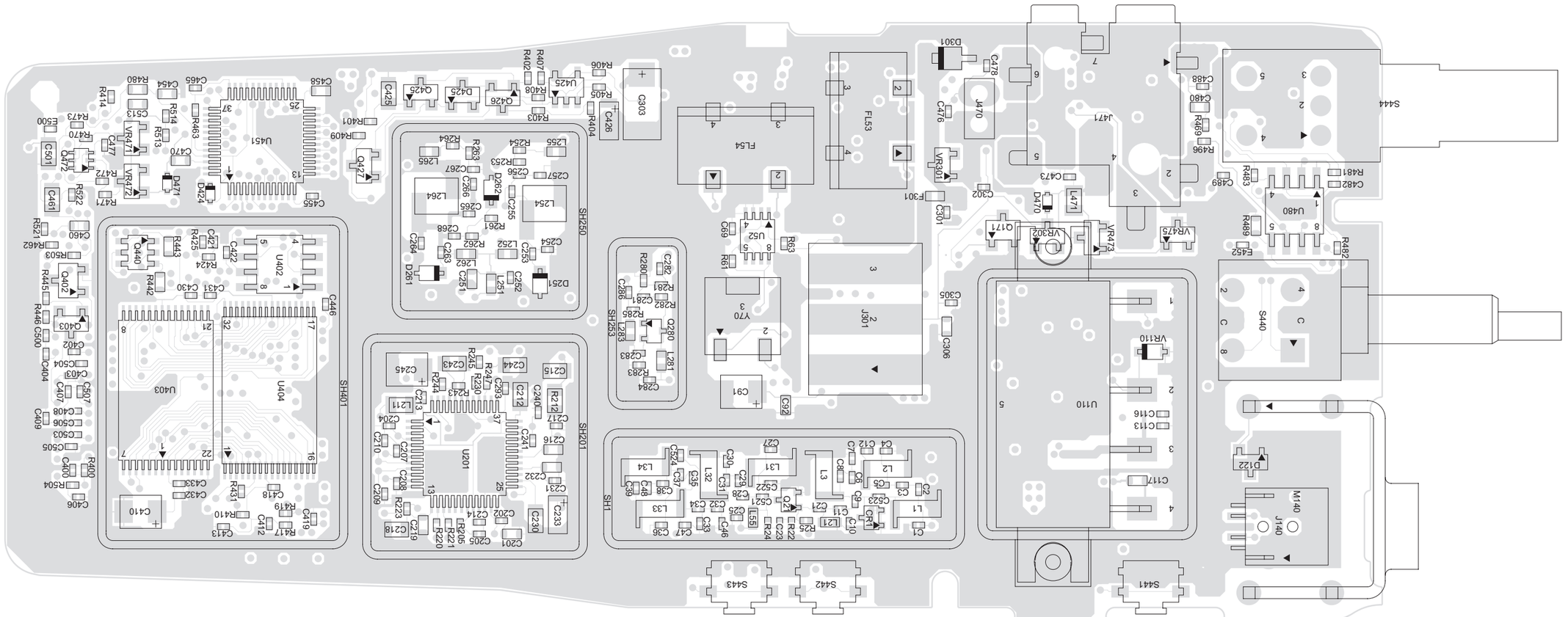


Figure 13-131. UHF (490–527 MHz) Board Component Side View (8416846H01-A/B)

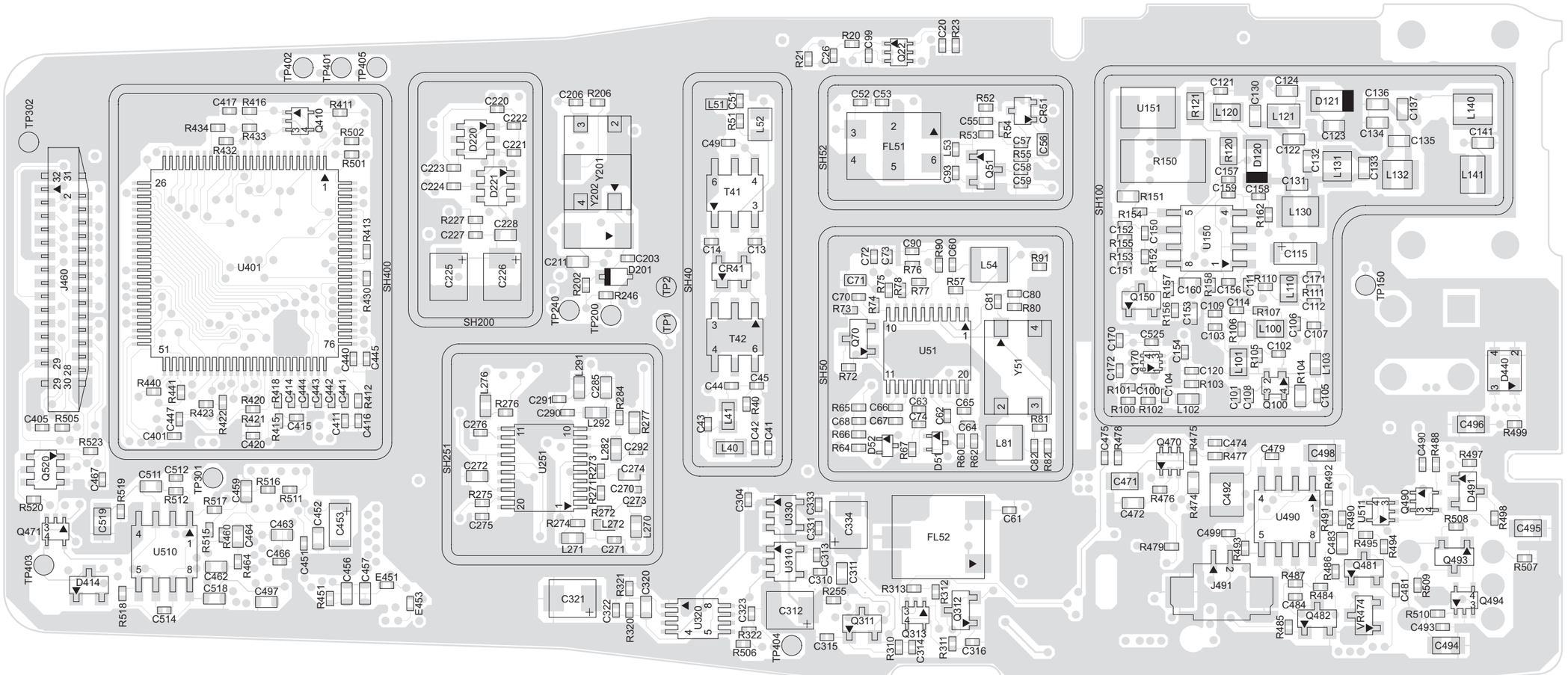


Figure 13-132. UHF (490–527 MHz) Board Solder Side View (8416846H01-A/B)

UHF (490–527 MHz) Radio Parts List (8416846H01-A/B)

Circuit Ref	Motorola Part No.	Description
C1	2115153H12	CAP, 2.4 pF
C2	2115153H14	CAP, 3 pF
C3	2115153H30	CAP, 6 pF
C4	2115153H42	CAP, 24 pF
C5	2115153H26	CAP, 9.1 pF
C6	2115153H11	CAP, 2.2 pF
C7	2115153H14	CAP, 3 pF
C8	2115153H36	CAP, 13 pF
C9	2115153H20	CAP, 5.1 pF
C10	2115153H07	CAP, 1.5 pF
C11	2113945A04	CAP, 390 pF
C12	NOT PLACED	64AM DUMMY PART NUMBER
C13	2115153H07	CAP, 1.5 pF
C14	2115153H07	CAP, 1.5 pF
C20	2113945A04	CAP, 390 pF
C21	2115153H27	CAP, 10 pF
C23	2113945A04	CAP, 390 pF
C25	2113945A04	CAP, 390 pF
C26	2113945A04	CAP, 390 pF
C27	2115153H11	CAP, 2.2 pF
C28	2115153H15	CAP, 3.3 pF
C29	2115153H57	CAP, 300 pF
C30	2115153H20	CAP, 5.1 pF
C31	2115153H03	CAP, 1 pF
C32	2115153H24	CAP, 7.5 pF
C33	2115153H48	CAP, 43 pF
C34	2115153H25	CAP, 8.2 pF
C35	2115153H06	CAP, 1.3 pF
C36	2115153H16	CAP, 3.6 pF
C37	2115153H57	CAP, 300 pF
C38	2115153H28	CAP, 4 pF
C39	2115153H14	CAP, 3 pF
C41	2115153H11	CAP, 2.2 pF
C42	2115153H25	CAP, 8.2 pF
C43	2115153H26	CAP, 9.1 pF
C44	2115153H26	CAP, 9.1 pF
C45	2115153H22	CAP, 6.2 pF
C46	NOT PLACED	64AM DUMMY PART NUMBER
C47	NOT PLACED	64AM DUMMY PART NUMBER
C48	0613952R66	RES, 0
C49	2115153H12	CAP, 2.4 pF
C51	2113944A38	CAP, 82 pF
C52	2115153H41	CAP, 22 pF
C53	2115153H26	CAP, 9.1 pF
C55	2113946K02	CAP, 100000 pF
C56	2113945C31	CAP, 10 uF
C57	2113946K02	CAP, 100000 pF
C58	2113944A15	CAP, 3.9 pF
C59	2113944A11	CAP, 2.7 pF
C60	2113946K02	CAP, 100000 pF
C61	2113944A36	CAP, 68 pF
C62	2113946K02	CAP, 100000 pF
C63	2113946K02	CAP, 100000 pF
C64	2113946K02	CAP, 100000 pF
C65	2113946K02	CAP, 100000 pF
C66	2113946K02	CAP, 100000 pF
C67	2113946K02	CAP, 100000 pF
C68	2113946K02	CAP, 100000 pF
C69	2113946K02	CAP, 100000 pF
C70	2113944A87	CAP, 130 pF
C71	2113945C31	CAP, 10 uF
C72	2113946K02	CAP, 100000 pF
C73	2113945A13	CAP, 4700 pF
C74	2113944A33	CAP, 47 pF
C80	2115153H41	CAP, 22 pF
C81	2115153H45	CAP, 33 pF
C82	2115153H46	CAP, 36 pF
C90	2113946K02	CAP, 100000 pF
C91	2313960D07	CAP, 10uF
C92	2113945C31	CAP, 10 uF
C93	NOT PLACED	
C99	2113946K02	CAP, 100000 pF
C100	2113945A04	CAP, 390 pF
C101	2113946K02	CAP, 100000 pF
C102	2113946K02	CAP, 100000 pF
C103	2113945A04	CAP, 390 pF
C104	2113944A21	CAP, 6.8 pF
C105	NOT PLACED	64AM DUMMY PART NUMBER
C106	2113945A04	CAP, 390 pF
C107	NOT PLACED	64AM DUMMY PART NUMBER
C108	2113945A04	CAP, 390 pF
C109	2113946K02	CAP, 100000 pF
C111	2113945A04	CAP, 390 pF
C112	2113946K02	CAP, 100000 pF
C113	2113945A04	CAP, 390 pF
C114	2113945A04	CAP, 390 pF
C115	2313960B01	CAP, 1 uF
C116	2113946K02	CAP, 100000 pF
C117	2113944C05	CAP, 390 pF
C120	NOT PLACED	64AM DUMMY PART NUMBER
C121	2113945A04	CAP, 390 pF
C122	NOT PLACED	64AM DUMMY PART NUMBER
C123	2113944C20	CAP, 3.9 pF
C124	2113944C05	CAP, 390 pF
C130	2113944C65	CAP, 1.2 pF
C131	NOT PLACED	64AM DUMMY PART NUMBER
C132	2113944C74	CAP, 7.5 pF
C133	NOT PLACED	64AM DUMMY PART NUMBER
C134	2113944C74	CAP, 7.5 pF
C135	NOT PLACED	64AM DUMMY PART NUMBER
C136	2113944C68	CAP,1.6 pF
C137	2113944C02	CAP, 220 pF
C141	2113944C62	CAP, .75 pF
C150	2113945A04	CAP, 390 pF
C151	2113945A04	CAP, 390 pF
C152	2113945A04	CAP, 390 pF
C153	2113946L04	CAP, 0.47 uF
C154	2113945A04	CAP, 390 pF
C156	2113945B02	CAP, 10000 pF
C157	2113946K02	CAP, 100000 pF
C158	2113945A04	CAP, 390 pF
C159	2113945A04	CAP, 390 pF
C160	2113945C31	CAP, 10 uF
C170	2113945A04	CAP, 390 pF
C171	2113945A04	CAP, 390 pF
C172	2113945A04	CAP, 390 pF
C201	2113944C02	CAP, 220 pF
C202	2115153H52	CAP, 62 pF
C203	2115153H13	CAP, 2.7 pF
C204	2113945A05	CAP, 470 pF
C205	NOT PLACED	64AM DUMMY PART NUMBER
C206	NOT PLACED	64AM DUMMY PART NUMBER
C207	2113945A05	CAP, 470 pF
C208	2113945A05	CAP, 470 pF
C209	2113945A05	CAP, 470 pF
C210	2113945A05	CAP, 470 pF
C211	2113945C31	CAP, 10 uF
C212	2113946N03	CAP, 2.2 uF
C213	2113945B02	CAP, 10000 pF
C214	2113945A09	CAP, 1000 pF
C215	2113946N03	CAP, 2.2 uF
C216	2113945C31	CAP, 10 uF
C217	2113945A09	CAP, 1000 pF
C218	2113946N03	CAP, 2.2 uF
C219	2113945C31	CAP, 10 uF
C220	2113944A29	CAP, 22 pF
C221	2113945B02	CAP, 10000 pF
C222	2113945B02	CAP, 10000 pF
C223	2113945B02	CAP, 10000 pF
C224	2113945B02	CAP, 10000 pF
C225	2313960D07	CAP, 10uF
C226	2313960D07	CAP, 10uF
C227	2113945A09	CAP, 1000 pF
C228	2113945C31	CAP, 10 uF
C230	2113946N03	CAP, 2.2 uF
C231	2113945A09	CAP, 1000 pF
C232	2113945C31	CAP, 10 uF
C233	2313960B30	CAP, 4.7 uF
C240	2115153H06	CAP, 1.3 pF
C241	2113944A40	CAP, 100 pF
C243	0886641Z01	CAP, .1uF
C244	0888600M25	CAP,
C245	2313960C26	CAP, 1 uF
C251	0888600M03	CAP,
C252	NOT PLACED	64AM DUMMY PART NUMBER
C253	2115153H22	CAP, 6.2 pF
C254	2115153H11	CAP, 2.2 pF
C255	2115153H26	CAP, 9.1 pF
C256	2115153H17	CAP, 3.9 pF
C257	2115153H35	CAP, 12 pF
C263	2115153H22	CAP, 6.2 pF
C264	2115153H10	CAP, 2 pF
C265	2115153H21	CAP, 5.6 pF
C266	2115153H14	CAP, 3 pF
C267	2115153H26	CAP, 9.1 pF
C268	2115153H01	CAP, 0.5 pF
C270	2113945A04	CAP, 390 pF
C271	2113945A04	CAP, 390 pF
C272	2113945C31	CAP, 10 uF
C273	2113945B02	CAP, 10000 pF
C274	2113945C31	CAP, 10 uF
C275	2113945A04	CAP, 390 pF
C276	2115153H24	CAP, 7.5 pF
C281	2113945A04	CAP, 390 pF
C282	2115153H18	CAP, 4.3 pF
C283	2113945A04	CAP, 390 pF
C284	2113945A04	CAP, 390 pF
C285	2113945C31	CAP, 10 uF
C286	2115153H17	CAP, 3.9 pF
C290	2115153H23	CAP, 6.8 pF
C291	2115153H36	CAP, 13 pF
C292	2113945A04	CAP, 390 pF
C293	2113945A05	CAP, 470 pF
C301	2113944A33	CAP, 47 pF
C302	2113945A04	CAP, 390 pF
C303	2313960F04	CAP, 33 uF
C304	2113945B02	CAP, 10000 pF
C305	2113944A40	CAP, 100 pF
C306	2113945L49	CAP, 10000 pF
C310	2113945B02	CAP, 10000 pF

Circuit Ref	Motorola Part No.	Description
C311	2113945C21	CAP, 18 uF
C312	2313960D07	CAP, 10uF
C313	2113945B02	CAP, 10000 pF
C314	2113945A60	CAP, 1200 pF
C315	2113945A60	CAP, 1200 pF
C316	2113945A60	CAP, 1200 pF
C320	2113945C21	CAP, 18 uF
C321	2313960D07	CAP, 10uF
C322	2113945B02	CAP, 10000 pF
C323	2113944A42	CAP, 150 pF
C331	2113945B02	CAP, 10000 pF
C333	2113945B02	CAP, 10000 pF
C334	2313960D07	CAP, 10uF
C400	NOT PLACED	64AM DUMMY PART NUMBER
C401	2113946K02	CAP, 100000 pF
C402	2113945A09	CAP, 1000 pF
C403	2113944A40	CAP, 100 pF
C404	2113945A09	CAP, 1000 pF
C405	2113944A40	CAP, 100 pF
C406	2113944A40	CAP, 100 pF
C407	2113945A09	CAP, 1000 pF
C408	2113945A09	CAP, 1000 pF
C409	2113945A09	CAP, 1000 pF
C410	2313960D07	CAP, 10uF
C411	2113946K02	CAP, 100000 pF
C412	2113945A09	CAP, 1000 pF
C413	2113946K02	CAP, 100000 pF
C414	2113946K02	CAP, 100000 pF
C415	2113945A09	CAP, 1000 pF
C416	2113945A09	CAP, 1000 pF
C417	2113945A09	CAP, 1000 pF
C418	2113946K02	CAP, 100000 pF
C419	2113945A09	CAP, 1000 pF
C420	2113945B02	CAP, 10000 pF
C421	2113945B02	CAP, 10000 pF
C422	2113945B02	CAP, 10000 pF
C425	2113946E02	CAP, 1 uF
C426	2313960B01	CAP, 1 uF
C430	2113946K02	CAP, 100000 pF
C431	2113945A09	CAP, 1000 pF
C432	2113946K02	CAP, 100000 pF
C433	2113945A09	CAP, 1000 pF
C440	2113945B02	CAP, 10000 pF
C441	2113945B02	CAP, 10000 pF
C442	2113945B02	CAP, 10000 pF
C443	2113945B02	CAP, 10000 pF
C444	2113945B02	CAP, 10000 pF
C445	2113945B02	CAP, 10000 pF
C446	2113945B02	CAP, 10000 pF
C447	2113946K02	CAP, 100000 pF
C451	2113946K02	CAP, 100000 pF
C452	2185895Z01	CAP, 1 uF
C453	2313960B30	CAP, 4.7 uF
C454	2113945C31	CAP, 10 uF
C455	2113945B04	CAP, 22000 pF
C456	2113945C31	CAP, 10 uF
C457	2113945C31	CAP, 10 uF
C458	2113945C31	CAP, 10 uF
C459	2113945C31	CAP, 10 uF
C460	2113945C31	CAP, 10 uF
C461	2113946F03	CAP, 4.7 uF
C462	2113945C31	CAP, 10 uF
C463	2113945C31	CAP, 10 uF
C464	2113945C31	CAP, 10 uF
C465	2113945A09	CAP, 1000 pF
C466	NOT PLACED	64AM DUMMY PART NUMBER
C467	2113945A60	CAP, 1200 pF
C470	2113945C31	CAP, 10 uF
C471	2113946N03	CAP, 2.2 uF
C472	2113945C31	CAP, 10 uF
C473	2113944A42	CAP, 150 pF
C474	2113944A42	CAP, 150 pF
C475	2113945B04	CAP, 22000 pF
C476	2113945B04	CAP, 22000 pF
C477	2113946K02	CAP, 100000 pF
C478	2113944A42	CAP, 150 pF
C479	2113944A42	CAP, 150 pF
C480	2113945C31	CAP, 10 uF
C481	NOT PLACED	64AM DUMMY PART NUMBER
C482	NOT PLACED	64AM DUMMY PART NUMBER
C483	2113945C31	CAP, 10 uF
C484	NOT PLACED	64AM DUMMY PART NUMBER
C488	2113945A05	CAP, 470 pF
C489	2113945A05	CAP, 470 pF
C490	2113945A05	CAP, 470 pF
C492	2113955E37	CAP, 10 uF
C493	2113945A09	CAP, 1000 pF
C494	2113946N03	CAP, 2.2 uF
C495	2113946N02	CAP, 1 uF
C496	2113946N02	CAP, 1 uF
C497	2113945C31	CAP, 10 uF
C498	2113946N02	CAP, 1 uF
C499	2113944A38	CAP, 82 pF
C500	2113945A09	CAP, 1000 pF
C501	2113946N02	CAP, 1 uF
C503	2113945A09	CAP, 1000 pF
C504	2113945A09	CAP, 1000 pF
C505	2113945A09	CAP, 1000 pF
C506	2113945A09	CAP, 1000 pF
C507	2113945A09	CAP, 1000 pF
C511	2113944C02	CAP, 220 pF
C512	2113944A21	CAP, 6.8 pF
C513	2113944C02	CAP, 220 pF
C514	2113944A79	CAP, 16 pF
C518	2113945C31	CAP, 10 uF
C519	2113946N02	CAP, 1 uF
C521	2115153H28	CAP, 4 pF
C522	2115153H07	CAP, 1.5 pF
C523	2186463Z05	CAP, 0.6 uF
C524	2186463Z05	CAP, 0.6 uF
C525	2113945A04	CAP, 390 pF
CR1	4813974A19	DIODE SCHOTTKY
CR41	4815923H01	DIODE SCHOTTKY
CR51	4813974A19	DIODE SCHOTTKY
D51	4815047H01	DIODE SWITCHING
D52	4815047H01	DIODE SWITCHING
D120	4880973Z02	PIN DIODE
D121	4880973Z02	PIN DIODE
D122	4813978C06	DIODE SWITCHING
D201	4815072H01	DIODE VARACTOR
D220	4815011H01	DIODE TRIPLE
D221	4815011H01	DIODE TRIPLE
D251	4885055Y01	DIODE VARACTOR
D261	4885055Y01	DIODE VARACTOR
D262	4885055Y01	DIODE VARACTOR
D301	4815713H01	DIODE SCHOTTKY
D414	4805129M41	DIODE SCHOTTKY
D424	4809924D29	DIODE HIGH VOLTAGE
D425	4805129M41	DIODE SCHOTTKY
D440	4805729G49	DIODE RED/YEL
D470	4809924D29	DIODE HIGH VOLTAGE
D471	4809924D29	DIODE HIGH VOLTAGE
D491	NOT PLACED	64AM DUMMY PART NUMBER
E451	2480640Z01	FERRITE BEAD
E452	2480640Z01	FERRITE BEAD
E453	2480640Z01	FERRITE BEAD
E500	2480640Z01	FERRITE BEAD
F301	6515076H01	FUSE SMT
FL51	9186801Z01	CRYSTAL OSC 44.85MHZ
FL52	9180468V04	5 ELEMENT FLTR
FL53	9115811H03	6 ELEMENT FLTR
FL54	9115811H01	6 ELEMENT FLTR
J140	0986428Z02	JACK, RF
J301	0986565Z02	BATTERY CONNECTOR
J460	NOT PLACED	64AM DUMMY PART NUMBER
J470	0985818A02	CONN 2 PIN
J471	0980683Z03	AUDIO JACK
J491	2815162H01	CONN 1.25MM
L1	2415428H08	IND, 9.85 NH
L2	2415428H08	IND, 9.85 NH
L3	2415428H08	IND, 9.85 NH
L21	2414017N18	IND, 33 NH
L31	2415428H08	IND, 9.85 NH
L32	2415428H08	IND, 9.85 NH
L33	2415428H08	IND, 9.85 NH
L34	2415428H08	IND, 9.85 NH
L40	2414017K16	IND, 27 NH
L41	2414017K16	IND, 27 NH
L51	2414017N26	IND, 150 NH
L52	2414032F43	IND, 560 NH
L53	2113944A41	CAP, 120 pF
L54	2414015A25	IND, 1200 NH
L55	2414017N16	IND, 22 NH
L81	2414015A19	IND, 1000 NH
L100	2414017K27	IND, 220 NH
L101	2414017K27	IND, 220 NH
L102	2415429H11	IND, 7.5 NH
L103	2415429H08	IND, 5.1 NH
L110	2414017K27	IND, 220 NH
L120	2414017K27	IND, 220 NH
L121	2414032F24	IND, 15 NH
L130	2460591C23	IND, 13.85 NH
L131	2460591C40	IND, 17.02 NH
L132	2460591C40	IND, 17.02 NH
L140	2460591L14	IND, 15.92 NH
L141	2479990M01	IND, 31 NH NH
L211	2414017K30	IND, 390 NH
L251	2414017N28	IND, 220 NH
L252	2414017N17	IND, 27 NH
L254	2415385H02	IND, 12.5 NH
L255	2414017N28	IND, 220 NH
L262	2414017N17	IND, 27 NH
L264	2415385H01	IND, 8.0 NH
L265	2414017N28	IND, 220 NH
L270	2414017N28	IND, 220 NH
L271	NOT PLACED	64AM DUMMY PART NUMBER
L272	2414017N28	IND, 220 NH
L276	2414017N17	IND, 27 NH
L281	2414017N15	IND, 18 NH
L282	2414017N15	IND, 18 NH
L283	NOT PLACED	64AM DUMMY PART NUMBER
L291	2414017N10	IND, 6.8 NH
L292	2414017N14	IND, 15 NH
L471	2414017K30	IND, 390 NH
M140	0286427Z02	NUT, ANTENNA

Circuit Ref	Motorola Part No.	Description
Q21	4802247J01	BJT, RF AMP, BFS505
Q22	4815267H01	TRANS DUAL PNP
Q51	4802197J95	RF TRANSISTOR
Q70	4813973M07	TSTR MMBT3904
Q100	4885593U03	TSTR NPN BFG540W
Q150	4813973M07	TSTR MMBT3904
Q170	4809939C34	TSTR DUAL PNP
Q171	4813973A42	TSTR NPN DIG
Q280	4802245J95	BJT, NPN TRANSISTOR
Q311	4815069H02	TSTR MOSFET P-CHAN
Q312	4815069H02	TSTR MOSFET P-CHAN
Q313	4815066H01	DIGITAL TRANSISTOR
Q402	4813973A42	TSTR NPN DIG
Q403	4813973A13	XSTR PNP40V
Q410	4815066H01	DIGITAL TRANSISTOR
Q425	4815069H02	TSTR MOSFET P-CHAN
Q426	4815069H02	TSTR MOSFET P-CHAN
Q427	4815069H02	TSTR MOSFET P-CHAN
Q440	4815154H01	DUAL TRANS NPNS
Q470	4815267H01	TRANS DUAL PNP
Q471	4815066H01	DIGITAL TRANSISTOR
Q472	4815267H01	TRANS DUAL PNP
Q481	NOT PLACED	64AM DUMMY PART NUMBER
Q482	NOT PLACED	64AM DUMMY PART NUMBER
Q490	4815066H01	DIGITAL TRANSISTOR
Q493	4815069H02	TSTR MOSFET P-CHAN
Q494	4815066H01	DIGITAL TRANSISTOR
Q520	4815154H01	DUAL TRANS NPNS
R20	0613952Q91	RES, 5600
R21	0613952Q48	RES, 91
R22	0613952Q91	RES, 5600
R23	0613952R11	RES, 27K
R24	0613952Q77	RES, 1500
R25	0613952Q91	RES, 5600
R40	0613952Q73	RES, 1000
R51	0613952Q42	RES, 51
R52	0613952R03	RES, 12K
R53	0613952R13	RES, 33K
R54	0613952Q92	RES, 6200
R55	0613952Q61	RES, 330
R57	0613952Q89	RES, 4700
R60	0613952Q82	RES, 2400
R61	0613952R25	RES, 100K
R62	0613952Q85	RES, 3300
R63	0613952R15	RES, 39K
R64	0613952R08	RES, 20K
R65	0613952R15	RES, 39K
R66	0613952R08	RES, 20K
R67	0613952R08	RES, 20K
R72	0613952Q63	RES, 390
R73	0613952Q79	RES, 1800
R74	0613952Q75	RES, 1200
R75	0613952R03	RES, 12K
R76	0613952Z55	RES, 12K
R77	0613952Z53	RES, 8.2K
R78	0613952Q69	RES, 680
R80	0613952Q90	RES,5100
R81	0613952Q73	RES, 1000
R82	NOT PLACED	64AM DUMMY PART NUMBER
R90	0613952Q42	RES, 51
R91	0613952Q78	RES, 1600
R100	0613952Q71	RES,820
R101	0613952Q19	RES, 5.6
R102	0613952Q71	RES,820
R103	0613952Q84	RES, 3000
R104	0613952H31	RES, 18
R105	0613952Q83	RES, 2700
R106	0613952Q89	RES, 4700
R107	NOT PLACED	64AM DUMMY PART NUMBER
R110	0613952Q69	RES, 680
R111	0613952Q80	RES, 2000
R120	0613958H53	RES, 150
R121	0613958H53	RES, 150
R150	0680539Z01	RESISTOR, METAL STRIP
R151	0613952H39	RES, 39
R152	0613952P01	RES, 100K
R153	0613952P01	RES, 100K
R154	0613952P01	RES, 100K
R155	0613952P01	RES, 100K
R156	0613952Q61	RES, 330
R157	0613952Q81	RES, 2200
R158	0613952Q77	RES, 1500
R162	0613952R01	RES, 10K
R202	0613952R29	RES, 150K
R205	0613952Q49	RES, 100
R206	NOT PLACED	64AM DUMMY PART NUMBER
R212	0613958J74	RES, 0 50
R220	0613952Q33	RES, 22
R221	0613952Q33	RES, 22
R223	0613952Q49	RES, 100
R227	0613952R15	RES, 39K
R230	0613952R06	RES, 16K
R243	0613952Q71	RES,820
R244	0613952Q42	RES, 51
R245	0613952Q77	RES, 1500
R246	0613952R25	RES, 100K
R247	0613952R07	RES, 18K
R253	0613952Q41	RES, 47
R254	0613952Q49	RES, 100
R255	0613952Z46	RES, 3.9K
R261	0613952R09	RES, 22K
R262	0613952Q94	RES, 7500
R263	0613952Q37	RES, 33
R264	0613952Q49	RES, 100
R271	0613952Q92	RES,6200
R272	0613952Q93	RES, 6800
R273	0613952Q61	RES, 330
R274	0613952Q37	RES, 33
R275	0613952Q49	RES, 100
R276	NOT PLACED	64AM DUMMY PART NUMBER
R277	0613952G67	RES, 0
R280	0613952Q89	RES, 4700
R281	0613952Q95	RES, 8200
R282	0613952Q72	RES, 910
R283	0613952Q52	RES, 130
R284	0613952Q69	RES, 680
R285	0613952R66	RES, 0
R310	0613952R25	RES, 100K
R311	0613952R25	RES, 100K
R312	0613952R08	RES, 20K
R313	0613952R01	RES, 10K
R320	0613952Z80	RES, 330K
R321	0613952P30	RES, 200K
R322	0613952R25	RES, 100K
R400	NOT PLACED	64AM DUMMY PART NUMBER
R401	0613952R36	RES, 300K
R402	0613952R01	RES, 10K
R403	0613952R01	RES, 10K
R404	0613952R18	RES, 51K
R405	0613952R36	RES, 300K
R406	0613952R33	RES, 220K
R407	0613952R25	RES, 100K
R408	0613952R25	RES, 100K
R409	0613952Q73	RES, 1000
R410	0613952R01	RES, 10K
R411	0613952Q71	RES,820
R412	0613952R25	RES, 100K
R413	0613952R25	RES, 100K
R414	0613952R13	RES, 33K
R415	0613952R13	RES, 33K
R416	0613952R08	RES, 20K
R417	0613952R01	RES, 10K
R418	0613952R25	RES, 100K
R419	0613952Q89	RES, 4700
R420	0613952P30	RES, 200K
R421	0613952P01	RES, 100K
R422	0613952R25	RES, 100K
R423	0613952R25	RES, 100K
R424	0613952P30	RES, 200K
R425	0613952P01	RES, 100K
R430	0613952R25	RES, 100K
R431	NOT PLACED	64AM DUMMY PART NUMBER
R432	0613952R66	RES, 0
R433	0613952R25	RES, 100K
R434	NOT PLACED	64AM DUMMY PART NUMBER
R440	0613952Q89	RES, 4700
R441	0613952Q89	RES, 4700
R442	0613952H57	RES, 220
R443	0613952H51	RES, 120
R445	0613952Q89	RES, 4700
R446	0613952R01	RES, 10K
R451	0613952R17	RES, 47K
R460	0613952R10	RES, 24K
R462	0613952R10	RES, 24K
R463	0613952R10	RES, 24K
R464	0613952R12	RES, 30K
R469	0613952Q25	RES, 10
R470	0613952Q81	RES, 2200
R471	0613952Q81	RES, 2200
R472	0613952Q69	RES, 680
R473	0613952Q69	RES, 680
R474	0613952H61	RES, 330
R475	0613952R31	RES, 180K
R476	0613952R25	RES, 100K
R477	0613952Q81	RES, 2200
R478	0613952Q81	RES, 2200
R479	0613952R25	RES, 100K
R480	0613952G67	RES, 0
R481	NOT PLACED	64AM DUMMY PART NUMBER
R482	NOT PLACED	64AM DUMMY PART NUMBER
R483	NOT PLACED	64AM DUMMY PART NUMBER
R484	NOT PLACED	64AM DUMMY PART NUMBER
R485	NOT PLACED	64AM DUMMY PART NUMBER
R486	NOT PLACED	64AM DUMMY PART NUMBER
R487	0613952R66	RES, 0
R488	0613952R37	RES, 330K
R489	NOT PLACED	64AM DUMMY PART NUMBER

Circuit Ref	Motorola Part No.	Description
R490	NOT PLACED	64AM DUMMY PART NUMBER
R491	0613952R66	RES, 0
R492	0613952R10	RES, 24K
R493	0613952R37	RES, 330K
R494	0613952Z80	RES, 330K
R495	0613952Q91	RES, 5600
R496	NOT PLACED	64AM DUMMY PART NUMBER
R497	NOT PLACED	64AM DUMMY PART NUMBER
R498	NOT PLACED	64AM DUMMY PART NUMBER
R499	NOT PLACED	64AM DUMMY PART NUMBER
R501	0613952Q49	RES, 100
R502	0613952Q49	RES, 100
R503	0613952Q49	RES, 100
R504	0613952Q49	RES, 100
R505	0613952Q49	RES, 100
R506	0613952Q49	RES, 100
R507	0613952Q49	RES, 100
R508	0613952R25	RES, 100K
R509	0613952R25	RES, 100K
R510	0613952R37	RES, 330K
R511	0613952R25	RES, 100K
R512	0613952R29	RES, 150K
R513	0613952R25	RES, 100K
R514	0613952R25	RES, 100K
R515	0613952R66	RES, 0
R516	NOT PLACED	64AM DUMMY PART NUMBER
R517	NOT PLACED	64AM DUMMY PART NUMBER
R518	0613952R33	RES, 220K
R519	0613952R25	RES, 100K
R520	0613952R25	RES, 100K
R521	NOT PLACED	64AM DUMMY PART NUMBER
R522	0613952R25	RES, 100K
R523	0613952R01	RES, 10K
S440	4080710Z34	FREQUENCY SWITCH 4CH
	4080710Z25	FREQUENCY SWITCH 16CH
S441	4070354A01	LIGHT TOUCH SWITCH
S442	4070354A01	LIGHT TOUCH SWITCH
S443	4070354A01	LIGHT TOUCH SWITCH
S444	1880619Z04	POTENTIOMETER
SH1	2686421Z02	SHIELD, FRONT END
SH40	2686419Z02	SHIELD, MIXER
SH50	2686423Z02	SHIELD, FRAC N

Circuit Ref	Motorola Part No.	Description
SH52	2686424Z02	SHIELD, INTERMEDIATE FREQ
SH100	2686418Z02	SHIELD, HARMONIC FILTER
SH200	2686424Z02	SHIELD, INTERMEDIATE FREQ
SH201	2686423Z02	SHIELD, FRAC N
SH250	2686425Z02	SHIELD, VCO
SH251	2686425Z02	SHIELD, VCO
SH253	2686422Z02	SHIELD, BuFFER
SH400	2686420Z03	SHIELD, CONTROL
SH401	2686420Z03	SHIELD, CONTROL
T41	2515121H01	BALUN TRANSFORMER
T42	2515121H01	BALUN TRANSFORMER
U51	5115281H01	FM IF IC
U52	5115070H01	IC 3-INV LMOS
U110	0186438Z06	UHF PA MODULE
U150	5114005A01	IC SING SPLY LM2904DR
U151	2415954H02	INDUCTOR BEAD
U201*	5185177Y01	IC TESTED AT25016
U251	5105750U56	VCO BuFFER IC
U310	5115746H01	VOL REGULATOR 5V
U320	5115679H01	IC VLTG REGLTR
U330	5115745H01	VOL REGULATOR 3V
U401*	5185143E03	68HC11FLO_PASS5
U402*	5115033H01	IC, EEPROM, 129
U403	NOT PLACED	64AM DUMMY PART NUMBER
U404*	5115037H01	4M FLASH ROM IC
U425	5115697H01	LOW PWR OP AMP
U451	5115062H01	IC ASFIC_CMP_R1
U480	NOT PLACED	64AM DUMMY PART NUMBER
U490	5116029H01	AUDIO AMPLIFIER
U510	5114005A01	IC SING SPLY LM2904DR
U511	4815066H01	DIGITAL TRANSISTOR
VR110	4813977A59	DIODE ZENER
VR301	4813977M29	DIODE 20V
VR302	4813977M29	DIODE 20V
VR471	4813977M14	DIODE 6.8V
VR472	4813977M05	DIODE 3.3V
VR473	4813977M29	DIODE 20V
VR474	4813977M29	DIODE 20V
VR475	4813977M24	DIODE ZENER
Y51	4802245J84	XTAL 44.395MHz
Y70	9186145B02	CER.DISCR.
Y201*	4880114R08	CRYSTAL 16.8MHZ
Y202	NOT PLACED	64AM DUMMY PART NUMBER
	5480678Z01	LABEL BARCODE

Circuit Ref	Motorola Part No.	Description
	8416846H01	ELP EPP U4 PCB

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Motorola Solutions, Inc.
1303 East Algonquin Road
Schaumburg, Illinois 60196 U.S.A.

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